Mission Safety Officer

Home Study Course

Mission Safety Officer
Home Study Course Part-1

Chapter 1: Introduction

1.1 Purpose

This course is a guide to prepare mission safety officer (MSO) trainees to demonstrate proficiency in the tasks required by CAPR60-4 and outlined in the CAPF101T-MSO to qualify to perform the role of MSO. This material is organized to match the tasks outlined in the "Mission Safety Officer Tasks" document, issued by the National Emergency Services Curriculum Project in October, 1998.

1.1.1 Role

The MSO is part of the ICS command staff, along with the Chaplain, the Liaison, and Information officers. MSOs report to incident commanders (IC) and are charged with conducting evaluations, briefings, and providing guidance for the entire mission staff and personnel to assure the mission is conducted safely and effectively. The MSO is also accountable to fulfill all reporting requirements applicable to any incident, accident, or mishap in compliance with applicable CAP, State, or Federal regulation.

The MSO monitors safety conditions, and develops measures for insuring the safety of all personnel.

1.2 Instructions

Personnel reading this training material should have met the prerequisites for issue of a CAPF101T and should hold a 101T. This material should be read and understood, along with the appropriate reference material (see below). At the end of each study section, you should take the section exam, grade it, and make sure you understand any answer you may have missed.

1.3 References

The following material is relevant to an MSO and you should thoroughly familiarize yourself with it:

1. CAPR 60-1: CAP Flight Management
2. CAPR 60-3: CAP Emergency Training and Operational Missions
3. CAPR 60-4, Volumes 1-2: CAP Emergency Services Forms (training and mission forms)
4. CAPR 60-5: Critical Incident Stress Management

Additionally, you should have some familiarity with appropriate incident reporting regulations (e.g. NTSB Part 830).

1.4 Section Exam

Chapter 2: Mission Base Setup

As a MSO in a CAP mission base, you need to conduct an analysis early on, preferably before the base is established, to assess the suitability of the proposed base to conduct the mission. You must evaluate all factors that may lead to a mishap related to the base, and create action plans to mitigate these risks, In some cases you may find that certain conditions require the outright rejection of a base location (e.g. operations that may require unusual pilot skills due to a very short runway).

2.1 Mission safety inspection

2.1.1 Mission Base Location Evaluation

The location of a base (whether in a building or not) and related facilities can create the potential for mishaps. The MSO must evaluate all factors that may potentially create a mishap risk, and create strategies for mitigating these.

2.1.1.1 Environmental issues

California is a large state that encompasses many climate zones. Each one presents unique challenges and needs to be addressed. Resources responding to the demands of a mission may focus so much on “getting the job done” that they may neglect important actions to assure their safety, comfort, and effectiveness. You need to be aware of these, and prepare guidelines and reminders for all volunteers to mitigate the threats of the environment around them.

The following table contains the 3 most common environments in California presenting inherent hazards and some strategies for dealing with them; this is not an exhaustive list, and you need to make sure you’re aware of potential threats and actively work to control them.

Table 0: Common California Hazardous Environments		
Environment	Threat	Mitigation Strategies
Desert Environment	Deserts are common in California and they create a number of threats to mission safety. In particular, volunteers working in and around mission bases in the desert will be susceptible to dehydration, sunburn, heat exhaustion, heat stroke; the dry, dusty air in deserts may also trigger asthma attacks in susceptible individuals.	Remind mission volunteers to drink frequently and abundantly before they become thirsty. Remember that the dry air in desert environments can quickly dehydrate even in air conditioned areas. Encourage all volunteers to use sunscreen and wear wide brimmed hats when outdoors. Limit exposure. Brief all team leaders to monitor their team members for signs or heat related problems.
Mountain Environments	California has many mountain towns. These may frequently be used for mission bases where the incident involves a mishap in the surrounding area (common around mountains). Some of the hazards to be on the lookout for include bitter cold in the winter, ice (particularly the possibility for slips and falls around base entry and egress points).	Make sure people dress appropriately when outdoors in the cold. Create teams to keep paths around the mission base building clear of snow and ice. Remind all volunteers of the threat of slipping and falling.
High Altitude Environments	High altitude environments can be encountered both, in mountainous, cold areas, as well as in high desert. Any environment above 6000' will provide a challenge due to the reduced ambient pressure to individuals who may not be in great physical shape and not acclimated to the altitude. Stress and exhaustion can accentuate the problems and impact decision-making ability.	Conduct briefings on high altitude. Encourage people to take breaks and work at a slower pace than they might at sea level. In cases (should be rare) of altitude sickness, seek medical attention immediately.

2.1.1.2 Weather patterns

Weather is a major factors in many accidents – whether aviation mishaps or road accidents. California has many locations where microclimates conspire to create locally hostile environments (e.g. winds swirling and high turbulence in Southern California during Santa Ana conditions). Often, these hostile conditions can be avoided by setting up a base a short distance away; local knowledge is a precious commodity and as MSO you should familiarize yourself with local weather hazards and make recommendations based on them. Some specific actions you should take include:

1) Get a thorough weather briefing using whatever means are at your disposal (Weather Channel, newspapers, National Weather Service web site, flight service station, etc.). Examine the topography around your mission base and reflect on how the large scale weather conditions may impact the local area around the base (e.g. prevailing wind and mountains, etc.)

2) If you are not local to the area, contact local flight schools, local residents, and other resources (e.g. FAA aviation safety counselors for your area). Take notes of their suggestions for safety.

3) Summarize your conclusions and findings and provide a copy to the IC and prepare a short note to provide all personnel operating from your mission base.

2.1.1.3 Accessibility

Reaching and departing the mission base must be safe; not only is it imperative that the base be accessible for the emergency services personnel (whether CAP or other agencies') but it must be easy to depart the mission base with reduced risk (i.e. when people are tired after a full day's work.

Examine all the major roads leading to the area and ask yourself the following questions:

1) Are these roads in good condition?

2) Are there multiple alternate routes to reach and depart the proposed mission base?

3) Are the roads particularly difficult to drive (e.g. two lane over mountainous terrain, with multiple switch-backs, poorly lit, etc.?)

4) How far are emergency services such as a firehouse, hospitals, police stations, etc?

Based on the answers to some of these questions, prepare a list of recommendations for the IC. For instance, if the answer to the third question is that the road is difficult to drive on, you may want to recommend that duty days be shortened so that personnel will not need to drive on a difficult road when exhausted, or require that all volunteers take a rest-break before returning home (in which case you will need an appropriate area for "napping").

2.1.1.4 Aviation conditions

Many CAP missions will require air support. At a high level, there are 3 types of air support that may be provided to a mission:

1) Air based DF or Search flying. This kind of operation is conducted by appropriately rated Mission Pilots. Search flying is often done at low altitude and is among the most dangerous flying in CAP (particularly around mountainous terrain).

2) High bird flying. High bird aircraft are communication relays that allow aircraft flying at lower altitudes to communicate with each other and with mission base. High bird missions can be flown by pilots rated as Mission Pilots or Transport Mission Pilots, are flown at high altitude, and are generally less challenging from a piloting perspective. High altitude considerations must be made, however, to assure the safety of the mission.

3) Transport flying. Aircraft may be employed to deliver supplies or personnel to and from mission bases. Pilots rated as Mission Pilots or Transport Mission Pilots may fly transport missions.

All these flight operations will need suitable facilities in at the mission base in order to support the flight operations.

The first item to verify is the suitability of the available runway for the proposed air operations. To this end, you need to know the field altitude and length, width, and orientation of all available runways; this information is available from an FAA publication "Airport Facilities Directory" available at any pilot supply store or through any local pilot. Once you have this information, you can begin drawing some conclusions.

First, look at the length of the available runways. The California Wing corporate fleet is composed primarily of Cessna 182 "Skylane" or Cessna 206 "Stationair" aircraft. The tables

below list conservative runway length requirements[1] for these aircraft to take off at various temperature conditions. Note that these requirements are for clearing a 50' obstacle at the departure end of the runway. You can compute lower numbers if the departure end of your runways is flat and has no man-made or natural obstacles (e.g. trees) that would create a hazard for a departing aircraft or make an emergency landing very dangerous.

Table 1: C206H Minimum Recommended RWY Length				
Field Elevation	50 F	68 F	86 F	104 F
Sea Level	2300	2500	2685	2873
2000'	2821	3035	3263	3510
4000'	3565	3744	4056	4394
6000'	4362	4758	5206	5713
7000	4966	5460	6032	NR[2]

Table 2: C182S Minimum Recommended RWY Length				
Field Elevation	50 F	68 F	86 F	104 F
Sea Level	1898	2041	2184	2340
2000'	2288	2457	2646	2847
4000'	2795	3022	3270	3536
6000'	3497	3809	4160	4563
7000	3959	4349	4791	NR[3]

For example, let's assume you're setting up a mission base in the town of Bridgeport, in Northern California. The local airfield has a runway that is 4329' long at an elevation of 6468'. Assume that it's summer and average temperatures are 60F-70F. Based on these facts (you can interpolate the altitude and the temperature, or simply use the next highest for each category for added safety), the airport is not suitable for operations by a C206. In this scenario, you would need to discuss alternative options with the IC. Some of your options include the possibility of securing higher performance aircraft (for instance, based on table 2 a C182 would be well suited to these operations), placing an operational limitation on pilots to fly at lower weights (the required RWY length under the same rules, drops down to 4202' at 86 F at the Bridgeport field elevation just by loading the same aircraft 300 pounds less than maximum gross weight), or prohibiting operations from the airport (least desirable, as it may require pilots to fly from farther away to participate in missions, thereby limiting their crew-day effectiveness and the aircraft range on-mission.)

Next, examine the runway orientation and width. All pilots are trained to land on the centerline of runways in varied crosswind conditions. However this is a difficult skill that must be practiced if the pilot is to remain proficient at it and aircraft have varying capacity to compensate for cross winds regardless of pilot skills. Both the Stationair and Skylane are very capable cross wind aircraft and their ability to land in a crosswind in CAP operations is limited by the requirements of CAPR60-1 to 15 knots of cross wind component. The first question you must answer then, in the absolute, is whether current or likely crosswinds (based on the weather research for the area) would exceed a 15-knot crosswind component (this can be calculated by comparing the wind direction and speed to the runway orientation, and using the conversion table reproduced below –

[1] The numbers are from the Information Manual for a 182T and 206H respectively, at maximum gross weight, plus a 30% safety margin. This information provides a good "rule of thumb" for these aircraft, but make sure you make allowances for aircraft age and actual model variant based on the information manual on the actual aircraft.
[2] Not Recommended
[3] Not Recommended

Table 4). If so, you need to recommend to the IC that a different base be established, or air operations not be conducted locally.

Table 4: Wind coefficients for RWY/Wind angle combinations					
Angle between RWY and Wind	Headwind Coefficient	Crosswind Coefficient	**Angle between RWY and Wind**	Headwind Coefficient	Crosswind Coefficient
0	1	0	**50**	0.64	0.77
10	0.98	0.17	**60**	0.50	0.87
20	0.94	0.34	**70**	0.34	0.94
30	0.87	0.50	**80**	0.17	0.98
40	0.77	0.64	**90**	0	1

On the other hand, if the crosswind component is less than 15 knots, then operations may be appropriate but you may want to restrict operations based on pilot skill and runway width. There are no hard and fast rules regarding this, however some guidelines are:

1) A runway that is 75' or less feet in width is narrow and may require extensive pilot skill to land in a strong cross wind (10-15 knots crosswind component).
2) A pilot with an FAA commercial pilot certificate will probably have received more training in crosswind landings than a pilot with a private license and may be safer in strong cross wind conditions.
3) A pilot with significant number of crosswind landings (10+) in the last six months will be safer in strong crosswind conditions.

Based on these guidelines, you need to make recommendations for the IC for screening pilots for local operations.

For example, the airport at Bridgeport (in the previous example) has a runway that is 60' wide and is oriented along 160º and 340º magnetic headings (note that runways are named by their magnetic orientation, so that the Bridgeport runway is named 16/34). Let's assume the wind is blowing from 010º at 20 knots and the IC wants a recommendation – what could these be?

The sample wind would make departing towards 340º preferable (would provide some headwind) and the 30º difference between the runway and the wind would yield a 10-knot crosswind component for the runway (the factor for 30º from the table above is 0.5 crosswind component). Given the extreme narrowness of the runway, and the relative strength of the crosswind, you might want to recommend that the IC or the operations head interview each potential pilot to assure currency of crosswind experience and/or a higher level of training in crosswind operations.

2.1.2 Facilities

As part of your initial evaluation, you need to make sure the facilities proposed for the mission base are safe.

2.1.2.1 Physical structure

Your first concern should be the physical structure of the building itself. Walk through the entire building and note any items that may be hazardous. Make sure you look for the following at a minimum:

1) Loose boards, uneven floors, or any other tripping hazard. Secure loose boards, mark other items, or otherwise resolve the threat.
2) Minimize fire hazards. Make sure there are no heat sources near easily inflammable substances (e.g. paper, rags, etc.). You might consider deploying fire extinguishers in all operational rooms.
3) Verify that ground connections work in all 3-prong outlets, and make sure no equipment being used has had its ground connector removed or disabled. If any piece of equipment has a "3 prong to 2 prong" adaptor, make sure the contact point for ground is attached through an electrical wire to a cold-water copper pipe or other good ground.
4) Check any fossil fuel fired hot water heater or furnaces. Verify the flues are clear and that the fittings are aligned. These devices give off Carbon Monoxide, a deadly odorless, colorless gas. If you suspect any problem with the venting, shut these devices off until a certified professional can check them.

2.1.2.2 Chemical / environmental hazard identification

Facilities where CAP mission bases may be established (e.g. on and around airfields) frequently contain unseen chemical and environmental hazards. You are not expected to be an expert in chemical hazard identification and clean up, but you should perform a quick inspection, alert the IC of any situation you may find suspicious, and you should remind all volunteers regarding hazards of handling commonly available substances (e.g. aviation fuel).

Begin by looking around the building and in particular look at any old pipes and heating ducts. Be on the lookout for the presence of asbestos insulation. Common areas where this may be found include: roofing and siding shingles made of asbestos cement, asbestos insulation in buildings erected between 1930 and 1950, hot water and steam pipes in older buildings may be coated with an asbestos material or covered with an asbestos blanket or tape, oil and coal furnaces and door gaskets may have asbestos insulation. If you notice frayed insulation or frayed material on any of these items, you should alert the IC and seek expert guidance; while it may not be asbestos, an expert's opinion will assure there is no hazard to people in the building. Additional guidance and advice can be obtained through the EPA or OSHA.

As you walk around the building, also be alert to any odor of gas, or solvent fumes. If you smell any gas, evacuate the premises and call the local gas utility immediately. If you should smell any solvents, try to identify the source. If the source can be identified, secure it, and air out the environment. If you cannot identify the source, you need to assess the impact to the air quality in the building. Seek out expert help if you're unsure; even small levels of solvent vapors can adversely impact comfort (they can lead to irritation, headaches, etc.) and health (many household and industrial solvents, for instance, are carcinogenic).

Outside, take a walk around the building. Again, be on the lookout for any chemical smells old drums, discolored, oily patches on the ground. If you have any concerns at all about the local environment, restrict access to suspect areas and request expert assistance to evaluate and, if necessary, clean.

Finally, aviation and car fuel, motor oil, and other common substances used in CAP aircraft and ground vehicles, are potentially hazardous. Remind all crews working with motor vehicles to exercise appropriate caution around these substances.

2.1.3 Emergency Preparation

As part of your base evaluation, you should identify the location of all relevant telephone number for all important emergency response facilities. Create a list with the nearest fire department, police, hospital, etc. Post the list prominently near each telephone on the base. Draw up route

maps to the nearest emergency medical facility and post prominently in several locations on the base.

Make sure evacuation plans and safety exits are posted throughout the building; if you're using a commercial building this may already be in place; if not, make sure you create these – even hand drawn – and post ubiquitously. Once you've identified fire escape routes, mark them prominently with handmade signs.

2.1.4 CAPR 62-1

The CAP has created a checklist to make sure no items are overlooked in this initial inspection. Have a copy of CAPR62-1 with you and review all your work against the checklist to make sure you've overlooked nothing.

2.1.5 Section Exam

1. List at least 3 different sources for current weather information.
2. Obtain local weather conditions. What would be the crosswind component for the runway at Bridgeport described above?
3. Find the closest emergency facilities, and their phone numbers, for a mission base to be established at Bridgeport, CA, airport.

Chapter 3: Operational Mission Tasks

3.1 Operational Evaluation[4]

Any CAP mission operation has mishap potential – that is an accident can result. This potential arises from the movement of people and machines over varying terrain and climate and the presence of energy sources – electricity and fuels – and natural phenomena: severe storms, high winds, and flooding. Each of these factors may be combined with relevant others to amplify the effects of either acting lone; e.g. flooding and high winds occurring together is a significantly greater problem than either occurring separately.

CAP Search and Rescue missions are further energized by our desire to save lives and minimize human suffering and do so in a timely manner. Thus our people are motivated to do their pre-departure tasks rapidly and launch into the search activity and may not fully or correctly complete their pre-departure duties. Further there is a human tendency to take chances or cut corners in the interest of getting this work done; these short cuts or deviations from standards can easily lead to mishaps. It is vitally important that mission management monitor mission personnel activities to spot and correct deviations from established procedures and safe practices to help insure SAR crews operate as safely as possible.

Our desire to save lives must be further tempered by the probability of finding survivors. The statistical probability of locating live survivors declines with every day following their presumed crash. Thus weather which might be considered marginally acceptable the first day of a search might well be unacceptable the tenth day of a search.

Your role as MSO is to temper the natural enthusiasm of the SAR personnel and assure that the right resources are assigned to the right tasks and that basic safety precautions are followed.

[4] Material in this, and following sections, was copied liberally from the Mission Safety Officer Tasks published by the National Emergency Services Curriculum Development Project.

3.1.1 Air operations

Flight operations are influenced by winds, weather, and environmental conditions. Each airplane and crew has different capabilities and must be evaluated for specific suitability. As MSO, you need to evaluate the overall match and potential for mishap and provide guidance to IC and/or Mission Coordinator.

3.1.1.1 Analyze environmental factors (altitude, runway length, etc.)

In the section above, we've analyzed overall environmental factors as they relate to specific mission bases. The same type of analysis needs to be repeated with each crew sortie to make sure that specific conditions in existence at the time of the sortie itself are within reasonable safety limits.

You should verify that the crosswind components on the runway are acceptable for the aircrew skill, experience level, and runway size.

3.1.1.2 Analyze weather issues and trends

Weather has a profound impact on air operations and a number of weather phenomena can create significant hazards to small aircraft flight. Some of the issues that you need to understand and consider their impact on safety have to do with winds and turbulence, icing, convection, visibility and ceilings.

Winds affect aircraft in several different ways. They create crosswind conditions on take-off/landing (and previous sections deal with this at length) and, once in the air, interact with terrain to generate turbulence including strong updrafts and downdrafts. You should obtain winds aloft forecasts and consider them in light of the local terrain. As a rule of thumb, any wind of more than 20 knots blowing across mountains will cause strong turbulence; any wind of more than 30 knots will cause strong updrafts and downdrafts and be potentially dangerous.

Icing is a very serious weather condition for aircraft. Ice can form in the aircraft's induction system, leading to a loss of power or on the airframe. The former can be managed by the pilot through the use of carburetor heat or alternate air supplies; the latter is much more dangerous as it adds weight and drag to the aircraft and degrades the wing's ability to generate lift. Conditions that are close to freezing and have visible moisture (rain – particularly freezing rain, snow, clouds, fog, haze) are conducive to icing. Any time these conditions exist or icing is forecasted you should exercise extreme caution. Threat of icing is sufficiently dangerous to halt air operations immediately.

Convection, or lifting, of air can generate thunderstorms. Be aware of conditions of high humidity where the atmosphere is unstable. Any time the temperature decreases more than 2ºC each 1000' the atmosphere is unstable and any lifting (either warming by the sun or wind blowing on the upslope of a mountain) can lead to thunderstorms. You can get atmospheric stability from weather sources or you can calculate it based on temperature at the surface and aloft. For instance, if you are at sea level at a temperature of 18ºC and the reported temperature at 9000' is less than 0ºC (2ºC/1000' x 9000' = 18ºC) the atmosphere is unstable. If it's greater than or equal to 0ºC the atmosphere is stable and not conducive to thunderstorm formation. The formation of towering clouds (cumulus clouds – see picture) is an indication that thunderstorms may be forming.

Thunderstorms are very hazardous to flight and must be avoided. Although pilots can fly around thunderstorms and visually avoid them, keeping a minimum of 20 nautical miles between their airplanes and the horizontal extent of any thunderstorm, no matter how small, is a good safety rule. Obviously, if there are thunderstorms in the area, search operations may be severely restricted and, since thunderstorm cells move about, their presence around the base may warrant suspension of air operations.

Visibility and ceiling (cloud cover) also affect flight operations. Weather for aviators can be categorized as Visual Meteorological Conditions (VMC) and Instrument Meteorological Conditions (IMC). VMC is generally defined as a visibility of more than 3 statute miles with ceiling of more than 1000', however any visibility under 5 miles is marginal. Flight in IMC requires the pilot to hold an FAA instrument rating and fly under instrument flight rules (IFR). Flight in VMC may be conducted under IFR as well as under visual flight rules (VFR).

IMC and marginal VMC conditions are inappropriate for search and rescue work, however may be appropriate for properly rated pilots to fly transport missions. Marginal VMC conditions at night are quite hazardous and you may want to recommend that the IC restrict night flight operations (probably transport operations or route searches only) to instrument rated pilots.

One of the constants of weather is that it constantly changes. While we can't control weather, very good forecasts are available. Short-term forecasts are particularly accurate and, when combined with overall analysis of current condition, can provide good insight into weather evolution. Once you have this insight, you have a constant mental picture of the weather and its evolution so you can respond not only to present conditions but you can provide alerts about potentially deteriorating conditions before crews set-off.

3.1.1.3 Evaluate and rate crew preparation for mission environment

In your role as safety staff to the IC you need to evaluate crew skills and preparation against the types of mission to be performed and raise any kind of potential hazard. There are few hard and fast rules regarding crew suitability for any given mission, and the mission coordinator or the IC will address these; you will need to use your judgment to fill in the rest. Some of the items you need to consider are:

1) Crew familiarity with local conditions. A crew from the local environment will be familiar with specific flying conditions and will generally be more prepared to cope with local peculiarities. For instance in Southern California, Santa Ana winds create conditions that appear wonderfully suited for flying (clear, sunny) while in fact may hide severe turbulence; a local crew will have experienced these conditions will exercise appropriate caution.

2) Crewmember familiarity with each other. Pilots who've flown with the same crewmembers (scanner, observer) on several occasions exhibit better crew resource management than crews that are thrown together on the day of a mission sortie. In fact, in a study of a highly structured airline environment, fatigued crews that had been flying together outperformed rested crews who were freshly composed of equally qualified crewmembers in emergency, high-workload situations.[5] Whenever possible, it is safer to keep crews intact and allow familiar crewmembers to fly together, even if it may mean a less than optimal crew assignment.

3) Crew fatigue level. While CAPR60-1 establishes maximum crew workday, crew performance decreases with fatigue. You should encourage rest periods; even short catnaps can have a significant impact on crew safety and performance. You can also recommend that crews fly more demanding missions when fresh (e.g. search and rescue) and less demanding operations later (e.g. transport, high-bird, etc.)

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[5] For more information on this study see Wiener, E. and Nagle, D., Human Factors in Aviation, Chapter 7 "Group Interaction and Flight Crew Performance", page 189, Fouschee, C., and Helmreich, R.

4) Crew experience and training levels. Examine flying conditions and crew experience, currency, and training level. Pilots with commercial or Airline Transport Pilot (ATP) licenses have received more training than pilots with a private pilot license and are more likely to fly more safely in high workload, difficult environments. Instrument rated pilots are more likely to conclude flights safely in marginal VMC or night VMC. Experienced pilots (those with more than 300 hours of time) are likely to respond better to emergency situations. Use your judgment to advise on optimum crew composition and mission assignment.

5) Aircraft capabilities. CAP corporate aircraft (and most member provided aircraft) are light, general aviation airplanes. Normally aspirated piston engines generally power these airplanes. These engines lose much of their power as the altitude increases; a C206's engine, for instance, only provides 65% of its full power at 10,000'. Consequently you need to evaluate the aircraft's performance against the mission it will be utilized for – airplane performance provides a margin of safety against downdrafts, flying out of difficult terrain situations (e.g. box canyons) and recovering from errors. If you have turbocharged airplanes available you may want to have them used for higher altitude searches and reserve the normally aspirated craft for lower level work. Likewise, you can look into any aircraft's information manual, in Section 5 (this is the same for all aircraft) and verify the aircraft's performance at various altitudes. If you have a choice pick the one with the highest performance at any given altitude for a search. Finally, verify the predicted climb rate at search altitude from the book based on current temperature and airplane loading; avoid any situation in which a crew would be flying a search with an airplane not able to climb at 200 feet per minute or better.

3.1.2 Ground operations

3.1.2.1 Verify vehicle issues

Just as the right aircraft must be matched to its mission, so should ground vehicles. In an urban setting, where all driving will occur over paved roads, almost any vehicle will provide an adequate platform. On the other hand, in more challenging environments (e.g. where off-road searching is expected) you will need to evaluate the suitability of the vehicle to the conditions. Off-road conditions create 3 separate hazards for drivers: loss of traction, ground obstacle clearance, overturning.

Loss of traction can be caused by loose road surface (e.g. sand, mud), which causes wheels to skid, or by a slick surface (e.g. snow, ice). The most effective type of vehicle in areas where traction losses may be encountered is a four-wheel (also called all-wheel) drive vehicle. The ability to lock or somehow limit the slip of the central differential can further prevent the possibility of getting stuck. Please remember that while all-wheel drive can keep ground crews from getting stuck, it won't help them stop more quickly or corner more sharply. In a situation with limited traction, crews need to exercise caution, reduce speed, and avoid sudden maneuvers.

Ground obstacle clearance is a function of the vehicle's tires and axels and is key for avoiding damage to the vehicle and, in extreme cases, cause a vehicle to become stuck over an obstacle. You can measure or validate ground clearance for any vehicle and use your judgment to prevent a certain model from being utilized in particularly difficult environment.

Finally, overturning is a danger with any vehicle with a high center of gravity (fairly common amongst SUVs.) A vehicle's propensity to overturn is often documented by tests done by Consumer Reports or other organizations. If you are aware that a particular vehicle has a higher likelihood to tip over, you may want to restrict its use to areas with few inclines.

3.1.2.2 Weather impacts on driving/scouting

Weather can have a negative impact on driving conditions by making roads slick; rain, snow and ice, all contribute to dangerous driving conditions. Make sure that any ground crew going out in inclement weather is aware of skid recovery techniques and is briefed on proper road safety in

slippery environments. You may want to restrict all vehicular movement right after freezing rain events to give road crews an opportunity to pour sand and/or salt and make the situation safer.

Ground teams on foot are challenged by weather that is either hot or cold. Crews going out on hot weather days need to carry an appropriate water supply. Crews going out on cold weather days need to have appropriate clothing. Either way, extreme weather conditions require more frequent breaks and shorter sortie durations.

3.1.2.3 Evaluate and rate ground team preparation for mission environment

Many of the same considerations that impact aircrews also impact ground crews in terms of experience and preparation. Familiarity with the local environment and experience will play a key role in mission safety. Be mindful of fatigue and encourage frequent rest breaks.

3.1.3 Section Exam

You've established a mission base at Bridgeport, CA. The wind is blowing from 265 at 14 knots, the visibility at the airport is 5 statute miles, the temperature is –3ºC, the forecast is for light snow beginning in 1-2 hours; there's a search to be conducted south west of the airport over high-desert terrain. The search should proceed by air and ground

1. You have an experienced local aircrew, flying a C206. Pilot holds a private license and has 270 hours of flight time. Would you recommend he fly the mission, wait, or should you find an alternative crewmember? Any other concerns?
2. Two ground teams are available and both have local experience. The first team has worked extensively together and has their private vehicle available, an all-wheel drive sedan. The second team never worked together although they are quite experienced CAP members; they have a large, 2-wheel drive SUV available. List your concerns about either of these teams setting out, and draft recommendations to the operations head.
3. The snow has started. Some OES personnel need to be flown to Bakersfield to pick up some supplies and drive back. Your pilot (from question –1–) is instrument rated and willing to fly the mission. What are your concerns and what might you do to increase the Mission's overall safety?

3.2 Ground Team Briefing

As a mission Safety Officer you may need to brief ground teams on safe operations in the field. While the Ground Operations Director or SMC is responsible for mission related tasks, you will be responsible for assuring the team and, in particular, the Ground Team Leader, are reminded of their responsibility for safety. Additionally the ground team may have members from other wings who may not be familiar with local laws and hazards. You need to make sure you provide them with sufficient information to operate lawfully and safely in California.

3.2.1 Environmental issues

California has unique environmental issues that may impact a safe search. You need to research local issues and remind the ground team of them and provide additional information as requested.

3.2.1.1 Weather

While setting up the Mission Base and performing your initial evaluations, you will have familiarized yourself with weather patterns, current weather, and forecasts. Share this information with the ground team focusing on aspects that may be applicable to the safety of their operations.

- Heat requires constant hydration. Make sure the teams understand the importance of avoiding dehydration and carry plenty of fluids. Brief on the signs of heat exhaustion and heat stroke, and make sure teams know how to respond.
- The California sun can be quite hot and is a hazard and may be even more of a hazard at higher altitudes where more UV rays reach the surface. Clothing should provide adequate protection against sunburn. Make sure team members are wearing sunscreen on exposed skin, minimum SPF 15. Remind them to reapply regularly. The sun can also cause damage to the eyes over time. Make sure the teams understand this danger and are encouraged to wear UV-blocking sunglasses.
- Cold weather can cause hypothermia, discomfort, and must be prepared for. Make sure members are properly dressed for cold environments.

3.2.1.2 Dangerous wildlife/vegetation

California has a number of natural hazards that ground teams need to be aware of. Make sure you research specific hazards in your local area, however the following are common, dangerous, and should be briefed:

- Rattlesnakes are the only venomous snake indigenous to California and are commonly found throughout the state, including mountains as high as 10,000'. Rattlesnakes hunt at night and during the day like to sun on rocks or, during hot days, may rest in shaded areas under earth overhangs or bushes. Rattlesnakes will bite if disturbed and may not rattle before striking. Rattlesnake bites, are seldom life-threatening but should be considered an emergency. There is no effective field-based treatment and systemic impact is generally delayed 2-6 hours after the bite. Teams should be instructed to loosen clothing around strike and take bitten team member to nearest hospital for treatment (administration of antivenin).
- Scorpions are generally considered desert creatures but in fact are common throughout California. Most scorpion stings are not dangerous except to individuals allergic to them (e.g. similar to bee or wasp stings). Any individual known to be sensitive to bees or wasps should assume sensitivity to scorpion stings and should carry appropriate treatment with them. Additionally, the Bark scorpion,

which is commonly found in California is quite poisonous and if encountered should be avoided; stings by these scorpions can be quite painful and dangerous and should be treated in a medical facility as soon as possible.

- California also has many types of poisonous spiders. While spider bites are not life threatening, they can be very painful and proper instruction must be provided on their

[6] © 2001 Jim Kalisch, University of Nebraska Lincoln Entomology, Used with Permission.

treatment. When in doubt, California Poison Control can be reached from anywhere in the state at (800) 876-4766. Some of the spiders to be aware of include[7]:

- Black Widow spider can be found in southern California and the Central Valley, typically in woodpiles, trash, or other dark places. Black Widows can be dangerous and if a Black Widow bite is suspected (looks like a red target mark on the skin) medical attention should be sought. Although nobody has died from a black widow bite in the US for more than 10 years, some of the symptoms can be serious. Severe muscle pain and cramps may develop in the first two hours after a bite; severe cramps are usually first felt in the back, shoulders, abdomen and thighs. Other symptoms include weakness, sweating, headache, anxiety, itching, nausea, vomiting, difficult breathing and increased blood pressure
- The jumping spider is probably the most common biting spider in the United States. People are caught by surprise and scared when they see the spider jump, especially if it jumps towards them. Bites from a jumping spider are painful, itchy and cause redness and significant swelling. Other symptoms may include painful muscles and joints, headache, fever, chills, nausea and vomiting. The symptoms usually last about 1-4 days.
- Wolf spiders are commonly found in California. They are large hairy spiders, up to 3-4 inches across. They are a mottled gray-brown color, which helps them hide in sand, gravel, leaves and other debris. Female wolf spiders carry their young on their backs. Except for one group, wolf spiders do not spin webs. They tend to burrow into the earth and hide. They are aggressive, come after their prey and are fast runners. Because of their impressive size and aggressiveness, wolf spiders can easily incite panic. Bites from a wolf spider can cause pain, redness and swelling. The large jaws/fangs can cause a tear in the skin as they bite. Swollen lymph glands may develop. The skin area at the bite may turn black. Swelling and pain can last up to ten days.
- The northwestern brown spider or hobo spider is well known in Oregon and Washington and is also quite common in Utah. Spider bites by this spider are becoming recognized more often in California, which may be due to the fact that the spider is becoming better known. The hobo spider often causes a bite that leaves an open, slow-healing wound. Bites from this spider are frequently and mistakenly thought to be brown recluse spider (which is not found in California!) bites. Keep the wound clean and prevent infection. If the bite becomes infected or does not seem to heal, see a physician.

- Bee stings can be dangerous for sensitive individuals. These individuals should carry their emergency kit and instruct other team members on its proper use.
- A number of mammals indigenous to California are potentially dangerous: coyotes, mountain lions, and bears. However the actual incidence of attacks by these animals is extremely low and common sense should prevent any harm coming to ground teams.
- California does not have plants that are inherently dangerous. Poison Ivy and Poison Oak can be a nuisance but wearing long pants and long sleeves will prevent most exposure. Prickly pear and other cactus can sting if touched, but that is also easily avoided.

[7] Material from the University of California, Davis, Health and Safety guide.

3.2.1.3 Other

Many California urban areas are heavily affected by traffic; this can be particularly disorienting to personnel visiting from other Wings or from more rural parts of the state. Your briefing should include a few words on defensive driving and specific mention about rush hour patterns.

3.2.2 Human factors

Ground teams, like any part of a CAP mission personnel, are eager to leave the base and get on with their work. This eagerness can lead to lapses in safety, and allow unseen issues to creep in. During the briefing, you need to remind the team to follow behaviors that will assure their safety and effectiveness.

3.2.2.1 Dehydration

Dehydration is a subtle enemy. Most people are at least partially dehydrated most of the time; by the time one experiences thirst, their body is already about a quart down. After about 2 quarts, headaches begin to set in. Any level of dehydration engenders increased susceptibility to heat exhaustion and heat stroke; in addition dehydrated individuals will not perform at peak level.

You need to remind ground teams to drink proactively (before they become thirsty) and avoid drinking liquids with caffeine content (caffeine is a diuretic). Once dehydration sets in, it can take a long time for full re-hydration; simply drinking a lot raises water content in the blood, but until the other tissues absorb it through osmosis –a relatively long process –most of the extra water in the blood will simply be picked up by the kidneys and excreted. Prevention of dehydration is therefore very important.

3.2.2.2 Fatigue

Fatigue robs personnel of their capabilities, makes them more error prone, and is an enemy of safety. Make sure you brief all ground teams about the importance of taking breaks – well before the end of a duty-day – and regular meals.

3.2.3 Equipment

Equipment needs to be tailored to the specific mission being done, however you need to remind all your ground teams of a few basic requirements.

3.2.3.1 Clothing

Clothing needs to be consistent with the environment. It should provide protection against the sun, against the elements as needed, and against scrapes, cuts, and abrasions. Additionally, clothing should be highly visible and at least orange day-glo vests must be worn. Full boots should be worn, ideally with a steel toe insert.

3.2.4 Vehicular Issues

You need to brief the ground teams on local laws for the safe operation of vehicles. Create a checklist based on the team composition (e.g. number of volunteers from out-of-state, etc.) and provide guidance on local laws and procedures. The California DMV has a free handbook that may make this task much easier to meet.

3.2.5 Section Exam

3.3 Aircrew Safety Briefing

CAP aircrews are eager to fly and get on with the business of finding their targets and save lives. You need to brief the aircrews on safe operations and make sure they don't violate any laws. In particular, you need to address specific information which aircrews from other areas may not be familiar with and remind all of safety in the operations.

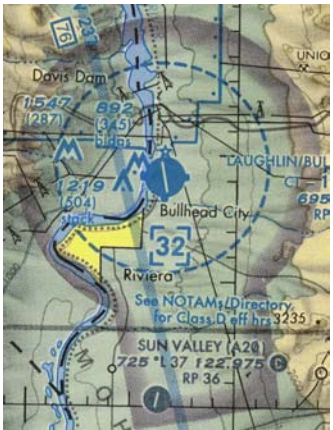
3.3.1 Flight environment

3.3.1.1 Airspace and air traffic

California has some of the most complex airspace in the country. Southern California, in particular around the Los Angeles airport airspace, and the area around San Francisco airport, have very intricate airspace patterns. You should be familiar with different types of airspace and be prepared to brief pilots on the airspace around the area of operations. The following types of airspace require at least some level of coordination with air traffic control and should be familiar to you – you'll want to brief aircrews on these to avoid any violation of the federal aviation regulations (FARs):

- Class "B" airspace is the most tightly controlled airspace that any CAP flight could need to fly through. In order to penetrate class "B" airspace a pilot needs an explicit clearance from air traffic control to enter the space. For instance "CAP flight 1234, socal approach, you are CLEARED TO ENTER LOS ANGELES CLASS B airspace at <altitude> etc." Barring such an explicit clearance, aircraft need to keep clear of this airspace. Class "B" airspace is marked on aeronautical charts by blue lines and the vertical extents of it are marked with blue numbers for the sector indicated. See the picture below. It shows a section of the Phoenix Class "B" airspace, together with several other local area airports in the vicinity. This kind of image – really complex airspace, is typical of Class "B". Several different vertical extents are captured in this picture, including a section near the center of the airspace showing 3000' to 10,000' and at the outer section the extents are 7000' to 10,000'. Operating from an airport under this airspace would require careful planning and navigation to ensure the airspace does not get penetrated without a clearance.

- Class "C" airspace is not as tightly regulated as class "B". In order to enter class "C" airspace the pilot needs to establish 2-way radio communications with the controlling authority. These means that the pilot would call the controlling authority (generally approach control) and receive a response quoting its entire call sign back. Class "C" airspace is marked on aeronautical charts with a magenta line and the vertical extent is indicated with magenta colors



for the sector indicated. See the picture depicting this. In the picture, showing Class "C" airspace around Tucson, the magenta numbers in the sectors show the vertical extent of the airspace. In the central section then, the airspace goes from the surface to 6600' and in the outer section it begins at 4200' and goes all the way up to 6600'.

- Class "D" airspace is similar to Class "C" airspace in the sense that 2-way radio communications are all that is needed to enter it, but it's not necessarily a RADAR environment and services are more restricted. A dashed blue line indicates it and its vertical extent is from the surface to the number indicated in square brackets in the middle of it. See picture showing the Class "D" airspace around "Bullhead/Loughlin" airport.

In addition to being complex from an airspace perspective, these areas are also full of traffic. Crews need to be reminded of the importance of keeping a proper look-out and should be encouraged to request RADAR flight following to get an additional set of eyes to keep them from running into other aircraft.

3.3.1.2 Weather

The pilot in command (PIC) is principally responsible for gathering weather information. Nevertheless, you should provide a quick briefing and reminder about the weather and, in particular, should brief the aircrew about specific microclimate information applicable to the local area, including the effect of terrain on winds and other local effects (e.g. the onset of fog in coastal areas, etc.)

3.3.1.3 Local operating rules

You should create a list of local operating rules for the aircrews to assure smooth ground and air operations – particularly at uncontrolled airports. Draw up a taxi diagram for the airport showing fuel facilities, mission base, and establishing flow patterns on the ground for mission teams. Discuss propeller and prop-wash precautions.

Review the traffic pattern information from the "Airport Facilities Directory" and brief the pilots on proper pattern entry and execution for the specific airport.

3.3.1.4 Survival environment in case of mishap

Aircrews need to be wearing Nomex fire retardant flight suits with natural fiber undergarments. Boots should be all leather, preferably with a steel toe insert. You need to make sure the aircrews understand the importance of this wear and encourage them to use Nomex gloves as well.

Each member of the aircrew has been trained in survival in cases of mishap but you should remind them about the importance of packing light survival kits and carrying them on their bodies.

3.3.1.5 Aircraft performance and crew preparation

Review the aircraft performance and make sure the PIC has reviewed takeoff and landing performance numbers in the appropriate configuration (aircraft loading, weather, wind, etc.) Make sure full weight and balance calculations have been made for both, take off and landing weight configurations (including fuel burn issues).

3.3.2 Human factors

Aircrews are subject to the same human weaknesses and limitations of any other kind of CAP crew. They must be reminded of their limits, operating rules must be established to assure compliance and safety; you also need to remind them about the subtle differences related to

operating in aircraft and make sure safety of operations is not compromised by excessive eagerness.

3.3.2.1 Experience

Obviously, experience is a critical safety factor, however experience is not a one-dimensional issue. A 3000-hour F-16 pilot may not be as safe conducting a search in the high desert in a C206 as a 400-hour local flight instructor. In this example, the flight instructor would be much more experienced with the local environment and probably safer. You need to be mindful of the experience level of each crewmember and brief accordingly; remind each of the limits of their experience (in the present example, you should remind the F-16 pilot of relative inexperience flying low performance aircraft in high-density altitude conditions).

3.3.2.2 Nourishment

During survival, crews are taught that humans can operate for many weeks with no food. While this is true in a survival environment, extended periods without food lead to a drop in blood sugar level and a decrease in performance. The human brain runs on glucose and critical thinking and decision making is one of the first faculties to be degraded – a very dangerous condition in a flight crew in a high stress environment. Remind crews to eat; ideally, crews should eat frequent small, easily digestible, meals or snacks. Cereals and grains (bread, crackers) should be the key components of the aircrew diet.

3.3.2.3 Fatigue

Fatigue is a subtle enemy, as noted in sections above. Remind crews about the fact that the general aviation cockpit is a high stress environment (high workload, noise, temperature extremes, etc.) that leads to fatigue more quickly than crewmembers may realize. Teach them to recognize signs of fatigue in each other, and request that they end a sorties as soon as any of them notice these signs in each other. Increases in sullenness, an uneasy silence on the intercom, fixation on a single task, or preoccupation with a fairly inconsequential matter in the aircraft are all signs of fatigue.

The only treatment for fatigue is rest. Discourage crews from drinking caffeine beverages, as the benefit these drinks may provide to alertness will be transient at best and caffeine will contribute to dehydration.

3.3.2.4 Preparation

Aircrews should fully prepare for a mission so that it can be conducted safely. This means that they need to review all pertinent facts regarding its successful conclusion. You should remind them to check the weather just before setting off, review routes and airspace, and review emergency procedures so they can be executed quickly and effectively.

3.3.2.5 Crew coordination issues

Remind crews about crew resource coordination issues. Basically this means that each crewmember and resource (including external resources, e.g. air traffic control) should be maximally utilized to enhance the safety and effectiveness of the operation.

Discuss with the crews the establishment of standardized communication processes (e.g. challenge-response, use of standard phraseology) and define flight segments during which a sterile cockpit (no communication between crewmembers that is not required by the operation itself) will be maintained; at a minimum, this should include taxi, takeoff, approach, and landing.

3.3.3 Aircraft review

Each CAP pilot demonstrates knowledge of systems and procedures for each aircraft that he is authorized to fly. Therefore, you should expect that the aircrews will be familiar with the aircraft they are about to fly and not need an in depth presentation of the aircraft. You should merely review the flight plan data regarding takeoff, landing, and performance for the current mission conditions.

3.3.4 Section Exam

3.4 Mishap Reporting

As much as you may want to avoid it, mishaps may occur. You need to respond as quickly as possible and in accord with local and federal laws, as well as applicable CAP documents and regulations.

In particular, applicable CAP regulation is CAPR62-2. The bottom line is that CAP accident reporting is aimed at swift activation of appropriate accident/incident response authorities as well as informing the CAP chain in command of the event. Unless directed by CAP national headquarters, CAP personnel should conduct no investigation into a mishap; this responsibility needs to be left to appropriate authorities.

Additionally, for any incident involving aircraft, pilots need to comply with NTSB regulations part 830. You are not expected to be familiar with this section, but pilots should be. Remind them of their responsibility and assist them in any way necessary.

3.4.1 Section Exam

3.5 Preparation for Visits by Non-Participants

During a CAP mission there will be many parties who may want to visit the mission base: local politicians, family members of missing persons, etc. These individuals are not familiar with a CAP mission and will not be familiar with the hazards inherent in the mission base nor be sensitive to the safety threat they can pose to other mission participants (by creating distractions).

You need to create a plan – working with your IC and your PAO/IO for mitigating these risks.

3.5.1 Avoidance

The first line of defense is avoidance. Try to keep any potential visitor out of the operational areas of the mission. You can set up a briefing area and waiting area for non-operational visitors; different visitors will have different needs which may be managed without exposing them to undue risk nor the mission to distraction.

Family members of people missing or believed to be missing primarily need to understand the status of search activities, they need to understand and feel the dedication and professionalism of the CAP volunteers carrying out the search, and they need emotional comfort and reassurance. You should work with the mission chaplain to set up an environment for them to be briefed regularly about search activities and progress, as well as to be comforted. The chaplain can guide you on how to best provide for their emotional needs.

Local politicians or senior members (i.e. non operational) of collaborating agencies (e.g. OES) may also wish to tour the mission base. These people's needs are quite different from those of loved ones and you need a different strategy. Often, scheduling some time for them to meet with the IC and/or PAO/IO to understand the activities being carried out will suffice for them. Make sure the PAO/IO has a briefing kit available and that you're able to provide such visitors with good printed material.

3.5.2 Identification of hazardous areas and their hazards

If your avoidance strategy fails, and the visitors insist on visiting the mission base, make sure you prepare a complete briefing for the visitors to conduct prior to taking them on a tour. This briefing should cover all potential hazards for each environment visited.

3.5.2.1 Flight line

Flight lines are very dangerous environments and you need to explain to the visitor what the hazards are and how to avoid them.

Begin by showing the visitor a map of the area, showing aircraft parking areas, pointing out taxiways and areas where aircraft may transition. Make sure you reinforce the need to look both ways if a taxi area around parking is to be crossed, and emphasize the need to avoid active areas, including active taxiways and runways.

Describe the risks associated with propellers and make sure the visitors are told to consider any propeller as potentially alive and to keep clear of them. Explain the effect of prop-wash and the risk of passing behind an aircraft with a running engine (having debris thrown in eyes/body). Finally, make sure the visitors are not wearing loose clothing items that may be blown off into the flight line and create a hazard (e.g. hats).

3.5.2.2 IC's office

The IC's office does not generally contain physical hazards per-se but may contain material which may be emotionally traumatic to people already apprehensive about the subject matter of the search. Make sure you sanitize the IC's office of any such material. In particular, be sensitive to any photographs, reports, or other material that may be visible and that could be emotionally troubling.

3.5.2.3 Communication center

A CAP mission base communication center has many unseen hazards that a visitor may not be aware of. Make sure you let your visitors know to watch for cables and wires that may be running along the floor and may trip them. Request them to keep their hands off all equipment and wires to avoid risk of electric shock. Finally, ask the visitors to avoid speaking to any of the mission personnel and to keep conversation quiet while visiting the communication center.

3.5.3 PAO/IO role and coordination

Any visit by non-participants to a mission base should be coordinated with the PAO/IO. Ideally, they should have material for handout that will answer most questions and minimize the need for a visit (see section above on avoidance). In all cases, however, you must make sure that the PAO has an opportunity to be present during the visit and manage the communication with the visitor.

3.5.4 Section Exam

3.6 Crew Stress, Fatigue, and Rest Monitoring

Crew stress and fatigue can quickly create lapses in judgment, performance, and lead to unsafe situations. You need to establish and use a mechanism to track and control the levels of fatigue and stress your crews experience.

The following paragraphs, reproduced from the FAA's Airman Information Manual (AIM) provide insight into the impact of fatigue, stress, and emotion on performance. These items impact all crewmembers and must be managed.

Fatigue continues to be one of the most treacherous hazards to safety, as it may not be apparent to a crewmember until serious errors are made. Fatigue is best described as either acute (short term) or chronic (long term).

A normal occurrence of everyday living, acute fatigue is the tiredness felt after long periods of physical and mental strain, including strenuous muscular effort, immobility, heavy mental workload, strong emotional pressure, monotony, and lack of sleep. Consequently, coordination and alertness, so vital to safe operations, can be reduced. Acute fatigue is prevented by adequate rest and sleep, as well as by regular exercise and proper nutrition.

Chronic fatigue occurs when there is not enough time for full recovery between episodes of acute fatigue. Performance continues to fall off, and judgment becomes impaired so that unwarranted risks may be taken. Recovery from chronic fatigue requires a prolonged period of rest.

Stress from the pressure of everyday living can impair crew performance, often in very subtle ways. Difficulties, particularly at work, can occupy thought processes enough to markedly decrease alertness. Distraction can so interfere with judgment that unwarranted risks are taken, such as flying into deteriorating weather conditions to keep on schedule. Stress and fatigue can be an extremely hazardous combination.

Most crewmembers do not leave stress behind. Therefore, when more than usual difficulties are being experienced, a crewmember should consider delaying participation until these difficulties are satisfactorily resolved.

Certain emotionally upsetting events, including a serious argument, death of a family member, separation or divorce, loss of a job, and financial catastrophe can render a crewmember unable to participate in a mission safely. The emotions of anger, depression, and anxiety from such events not only decrease alertness but also may lead to taking risks that border on self-destruction. Any crewmember that experiences an emotionally upsetting event should not fly until satisfactorily recovered from it.

Aircraft accident statistics show that crewmembers should be conducting preflight checklists on themselves as well as their equipment for crew impairment contributes to many more accidents than failures of aircraft systems. A personal checklist, which includes all of the categories of possible impairment and that can be easily committed to memory is being distributed by the FAA in the form of a wallet-sized card.

Personal Checklist. I'm physically and mentally safe to fly; not being impaired by:
I*llness*
M*edication*

S*tress*
A*lcohol*
F*atigue*
E*motion*

3.6.1 Crew Monitoring

You should track all the crewmembers' activities to assure that they don't become overly fatigued and that they remain safe. Each crewmember should check-in and check-out of the duty day.

You should make sure that you track the total duty time and make sure that maximums are not reached. You must also make sure you brief the crewmembers on the importance of proper rest when they leave the mission base. Additionally, you should track their activities and assignments to assure that they have sufficient time for breaks, food, etc. Finally, you should work with the various section heads to recommend progressively easier assignments for crewmembers as their duty day extends.

3.6.2 Section Exam

3.7 Vehicle Inspection

Each vehicle being used in a mission should be inspected. This inspection should not be as complete as a professional mechanic may perform, but it should cover all the key items of critical import to safety. The form at the end of this document, in the appendix section, should be used for performing these inspections. Most of the items in it are self-explanatory.

3.8 Aircraft Inspection

For aircraft inspections, the CAP provides form 71, which is reproduced in the appendix to this document. The instructions for completing form 71 are included below.

The CAPF 71 is designed to assist the inspector in determining the overall condition of the aircraft, as well as ensuring compliance of FAA and CAP regulations and directives.

1) Aircraft Records.
    a) Airworthiness Directive Listing in Logbook: FAR 91.417 requires the aircraft records (logbooks) to contain the current status of applicable airworthiness directives, the method of compliance, the AD number, revision date, and recurring action if required. The A&P / AI should have performed and documented all applicable ADs as part of the 100-hour or annual inspection and updated the compliance listing in the maintenance logs.

    b) Equip List (CAPF 37) Matches Installed Equipment: HQ CAP requires all wings to account for equipment installed in aircraft, such as radios, on a CAPF 37. Confirm the CAPF 37 is complete and matches the type equipment installed in the aircraft. Verification of serial numbers is not required.
    c) Instrument Requirements: FAR par 91.411 and 91.413 requires the altimeter, pitot static and transponder to be tested and inspected every 24 months. The inspection dates are annotated in the airframe logbook, which usually are not kept in the aircraft. The maintenance officer or unit commander controlling this aircraft can provide you the records.
        i) Item c4). VOR Check: The VOR check is required by FAR 91.207 to be accomplished prior to the flight or within the preceding 30 days if the aircraft is to be operated under IFR. The pilot can accomplish this test by checking the VOR against a designated VOR checkpoint on the ground or by flying over a prominent ground point, or if the aircraft has dual VORs by checking them against each other. When performing the check, the pilot should record the date, place, bearing errors and sign the log or record. The aircraft cannot be flown IFR if this check has not been performed or logged!
        ii) Item c5). ELT Battery: FAR 91-207 requires the expiration date of the ELT battery be legibly marked on the outside of the transmitter and entered in the aircraft logbook. FAR 91-207 requires ELTs to be inspected during the aircraft annual inspection and this inspection annotated in the aircraft logbook.
2) Aircraft Interior.
    a) Check for obvious defects, leaks, corrosion, cleanliness, and condition of interior.

b) Placards: Not for Hire/Maximum Crosswind/ Cessna Seat Slippage Warning/Operating Limits. Ensure these placards are properly installed and visible. These placards can be ordered through the CAP Supply Depot in Amarillo TX.
c) Avionics and Control Locks Installed: Assure the avionics and control locks are installed. Aircraft radio & nav equipment are very expensive and can be easily stolen. The hole drilled in the control column for installation of the control lock should be centered to assure the flight controls are locked in the neutral position. On many Piper aircraft, the seat belt is used to hold the flight controls in a static position versus the use of a control lock.
d) Fire Extinguisher: Check that one is installed and serviceable (in the correct range).
e) Shoulder Harness: CAPR 66-1 states that all CAP corporate aircraft will have shoulder harnesses for the pilot and co-pilot positions. Newly assigned aircraft have 90 days to have them installed; after 90 days, the aircraft is grounded until they are installed. FAR 91.205 also requires shoulder harnesses on aircraft manufactured after July 18, 1978.
f) Carbon Monoxide Detectors: For safety, disposable 12- to 18- month carbon monoxide detectors will be installed in all CAP-owned aircraft. Inspect detectors for serviceability (change of indicator color) and valid expiration date. These detectors will be replaced every 12 months
g) Cessna Seat Rail Condition: The Cessna seat rails must be checked for overall condition. Check specifically for any cracks in the rails or runners. If any cracks or questionable defects are found, have an A&P mechanic inspect it for serviceability. Also, check for elongation of the holes on the rails, seat locking pin rounding and roller washer wear.
h) Secondary Seat Stop Installed (All Cessna Aircraft, Excluding 172R and Older Models): The secondary seat stop requirement is required for all Cessna aircraft, excluding the 172R and later models. Cessna redesigned the seat rails on this model, eliminating the requirement. The secondary seat stop is installed on the right side of the pilot's seat (left front seat) to prevent it from sliding if the seat pin fails. This is a HQ CAP mandatory equipment requirement.
i) Cargo Tie-down or Cargo Net: FAR 91.525 requires cargo to be properly secured by a safety belt or other tie-down method having enough strength to eliminate the possibility of shifting during operation. Cargo net is recommended for the cargo compartment.
j) Airworthiness Certificate and Registration: These items are normally kept together and mounted in a pouch attached to a sidewall of the aircraft. The Airworthiness Certificate is issued when the aircraft is manufactured; the registration is issued with a change in ownership (i.e., when HQ CAP purchased it). The Radio License is no longer required for operations inside the US.
    i) Operating Handbook & Weight & Balance: FAR 91-9 requires each aircraft to have an operating handbook and displayed operating limits in the form of placards or instrument markings. Ensure the ones required for the specific aircraft you are inspecting are up-to-date (for example, has all the latest equipment added to the aircraft been reflected in the weight & balance data?). Ensure a flight manual, matching the make/model/year of the aircraft, is kept in the aircraft. Check the book for condition, i.e., loose, torn, or missing pages. Ensure the weight and balance data sheets are posted in the book.
k) Survival Kit. Assure a survival kit has been established and is available during every flight.

3) Aircraft Exterior.
a) Properly Chocked, Tie-Down Method/Condition of Ropes: All aircraft, when not being operated, are required to be properly chocked and secured. The aircraft should also be tied down at 3 points. Chains may be used providing the chain is not directly attached to the ground anchor point. This configuration will damage the wing spars because there is no flexibility during wind gusts. Nylon rope with at least a 3,000 lbs. tensile strength is recommended.
b) Exterior Corrosion: HQ CAP emphasizes an aggressive aircraft corrosion prevention program and provides ACF-50 corrosion prohibitor, free to CAP units, to be sprayed on

the aircraft. Note any corrosion you find. It is expensive to repair; however, it is less expensive to repair if caught early. This is the most important item to check during your inspection. The primary purpose of paint is to prevent corrosion with a secondary purpose of enhancing appearance. Therefore, look closely for corrosion, and missing or chipped paint. Units need to do touch-up painting on their aircraft and not just let them deteriorate. Corrosion can best be checked by removing an access panel on the leading edge area of the wing and visually looking for corrosion or by looking at exposed metal inside the aircraft such as under carpets. Check for cracks in the aircraft skin. If a crack is detected and has a hole drilled at the progressive end of the crack, this is OK. It is a previous repair called "stop drill" and is designed to stop the crack from progressing any further. If, however, the crack has not been stop drilled or the crack has progressed, it should be repaired.

c) Condition of Propeller. Inspect propeller, paying particular attention to nicks and evidence of stress (blade trailing edge wavy) on the propeller. Also check for excessive rubbing marks between spinner and cowling.

d) External Identification Plate: FAR 45-11 requires a fireproof plate that is etched, stamped, or engraved with the builder's name, model designation, and serial number. It must be secured to the exterior of the aircraft near the tail surfaces or adjacent or just aft of the rear-most entrance door. If the aircraft was manufactured before March 7, 1988, the plate can be attached to an accessible interior or exterior location near an entrance; however, the model designation and serial number must also be displayed on the aircraft fuselage exterior.

e) CAP Seal. A CAP seal must be installed on the vertical stabilizer of all CAP aircraft.

f) Brakes. Check brakes and brake lines for leaks, wear, and obvious defects.

g) Tires. Check tires for proper air pressure and serviceability.

h) Engine Cowling Fit & Fastener Condition: Check the cowling for proper fit and contour. Check the condition of the fasteners holding it in place. Loose, improper, or defective fasteners or nutplates could cause the cowling to separate during flight.

i) Door Hinge Pins (Cessna): Check the door hinges for proper hinge pins. Only authorized Cessna hinge pins will be installed in CAP aircraft. Cotter pins, quick release pins, nails, etc., will not be used and are easily identifiable. For reference only, the correct part numbers are: Cessna 172 upper hinge pin - P/N 0711001-59; Cessna 172 lower hinge pin - P/N 0517019-12; Cessna 182 upper and lower hinge pin - P/N 0711038-1

4) Exterior and Interior Lighting for Proper Operation

a) Items a, b, c, d, e, and f. Exterior Lighting for Operation: Check all lights for operation. You may do this by turning on the master switch and all lights. Most of the items on the checklist are self explanatory. The dates and times for the aircraft is annual , 100-hour inspections, and oil changes should be in the aircraft logbooks. Tach times should be used to determine when maintenance actions are required. POC for this checklist is HQ CAP-USAF/LGM, Maxwell AFB AL (334) 953-6032 or DSN 493-6032.

Cap Aircraft Inspection Checklist

Wing:_____ Date/Tach Time Last 50-Hour Insp/Oil Change:_____
Tail #: _____ Date/Tach Time @ Last 100-Hour Insp: _____
Make/Model/Year: _____ Date/Tach Time @ Last Annual Insp: _____
Tach Time: _____

Inspection Item (Installed/Serviceable/Current ⇒)	3.9 Y	N	Remarks / Discrepancy
1. Aircraft Records			
A. Aircraft Logbooks- 50-Hour Insp/Oil Change, 100-Hour Insp, Annual Insp, & Airworthy Directives (AD) Compliance Listing Current (Ref: FAR 91.417)			
B. Equipment List (CAPF 37) Matches Equipment Installed			
C. Instrument Requirements			
1) Altimeter System Current – Entry in Logbook (24 Mo. Ref: FAR 91.411)			
2) Pitot / Static System Current – Entry in Logbook (24 Mo. Ref: FAR 91.411)			
3) Transponder Current – Entry in Logbook (24 Mo. Ref: FAR 91.413)			
4) VOR Operational Check – IFR Only (30 Days Ref: FAR 91.171)			
5) ELT Battery Current – Entry in Logbook (Ref: FAR 91.207)			
Chapter 4: 2. Aircraft Interior			
A. Obvious Defects, Leaks, Corrosion, Cleanliness, and Condition of Interior			
B. "Not for Hire" Placard Displayed (Ref: CAPR 66-1)			
C. "Max Crosswind" Placard Displayed (Ref: CAPR 66-1)			
D. "Cessna Seat Slippage Warning" Placard Displayed (CAPR 66-1)			
E. Operating Limits / Placards (Ref: FAR 91.9)			
F. Avionics and Control Locks Installed (Ref: CAPR 66-1)			
G. Serviceable Fire Extinguisher Installed (Ref: CAPR 66-1)			
H. Shoulder Harnesses Installed (Ref: FAR 91.205)			
I. Carbon Monoxide Detector – Serviceability, Expiration Date (CAPR 66-1)			
J. Cessna Seat Rails for Cracks & Wear (Ref: AD 87-20-03, Rev 2)			
K. Secondary Seat Stop Installed (All Cessna Aircraft, Excluding 172R)			
L. Cargo Tie-Down Or Net Installed (Ref: FAR 91.525)			
M. Required Documents in Aircraft A-R-O-W			
1) Airworthiness Certificate (Ref: FAR 91.203)			
2) Registration (Ref: FAR 91.203)			
3) Operating Handbook (Ref: FAR 91.9)			

4) Weight & Balance Data (Ref: Acft Flight Manual / POH)			
N. Survival Kit. (Ref CAPR 66-1)			
3. Aircraft Exterior			
A. Aircraft Properly Chocked, Tied Down, and Condition of Ropes			
B. Obvious Defects, Leaks, Corrosion, Cleanliness, and Condition of Paint			
C. Condition of Prop – Nicks, Dents, Leaks, Corrosion, Evidence of Prop Strike			
D. External Aircraft Identification Plate (Ref: FAR 45.11)			
E. CAP Seal Installed on Vertical Stabilizer			
F. Brakes for Leaks, Wear, and Obvious Defects (Ref: Acft Service Manual)			
G. Tires for Proper Air Pressure and Serviceability (Ref: Acft Service Manual)			
H. Engine Cowling for Proper Fit And Contour / Fasteners Serviceable and Secure			
I. Cessna Door Hinge Pins Installed			
4. Exterior And Interior Lighting For Proper Operation			
A. Interior Overhead (Flood/Dome)			
B. Landing / Taxi / Pulselite			
C. Anti-Collision Strobe (Ref: FAR 91.209)			
D. Navigation / Position (Ref: FAR 91.209)			
E. Flashing Beacon			
F. Instrument			
Name Of Inspector:			**Date:**

4.1.1 Section Exam

4.2 Flight Operations Safety Plans

All operational environments present specific risks that must be managed to assure the overall safety of the operations. These risks change as the mission progresses and you should develop simple and effective plans to manage these changes and assure that new hazards are properly dealt with.

4.2.1 Physical plant

If the mission lasts more than a few hours, the facilities, which you secured at the beginning, may present new hazards. Ice may form on steps that were previously clear, boards may loosen, etc. You should brief all participants to keep their eyes on unsafe conditions and report them to you as soon as possible. Additionally, you should create a schedule for repeat inspections of the physical plant to assure that it remains in the safe conditions that were set up initially.

4.2.2 Operations

The movement and coordination of various crews – aircrews, ground crews, etc. – can create congestions and hazards related to the movement of people and machines. You should look at all the crew staging areas and create flows that will keep different types of crews out of each other's way. For instance, you should avoid having ground crews walk through a taxiway to move

from the base to the road where their vehicles may be parked. By creating efficient flows for various operations, posting and briefing them, you will assure continued safety for the operations.

Similarly, traffic patterns on the ground and in the air should be evaluated. For the aircrews, the airport may have a clearly established (or even controlled) traffic pattern. However if the airport is a small field seldom used (for instance, the Calipatria airport in Imperial County) it may be appropriate to establish a standard departure and arrival procedure for aircrews to minimize collision hazards and to keep them out of hazard's way. In this, you may want to enlist the help of the FAA Flights Standard District Office's (FSDO) Safety Manager of one of the volunteer Aviation Safety Counselors who may be able to provide you with local insights and assure a more orderly flow consistent with local procedures. Finally, if you have sufficient equipment and human resources, you may want to set up an aviation radio and a rudimentary weather station to provide aircrews with current weather (barometric pressure, temperature, wind and, if possible, dew point).

Taxi flows should also be established to keep aircraft moving efficiently and safely. This should include guidelines for pulling up to fueling stations, proper orientation, and fueling procedures. Make sure you remind all crews about the importance of grounding aircraft when refueling.

Similar flows should be established for ground vehicles, including designated parking areas, and appropriate staging areas.

Finally, there needs to be a standard process for reporting discrepancies found in aircraft or vehicles to make sure any potentially hazardous condition is noted. Review the aircraft "squawk" procedure (generally each aircraft will have a "squawk" book) with aircrews and create similar processes for ground vehicles. Finally, repeat inspections to aircraft and vehicles as necessary (as often as daily, if conditions are particularly tough, such as in dusty, hot environments, etc.)

Chapter 5: Vehicle Inspection Form

Vehicle Inspection Checklist

Date:_____ Wing:____ Vehicle License #:_____ Reg #:_____ Mileage _____

UnitAssignedTo:_____ 2wd o r 4wd:_____ Wing ID #_____ Inspector:_____

Make of Vehicle:_____ Model:_____ Color:_____ Year:_____

Static Inspection

Item	Sat	Unsat	Comment
Windshield Condition			
Windows Cond/Oper			
CAP Seal / Markings			Optional
CAP Forms 73/74/78			
Hi Beam Headlights			
Low Beam Headlights			
Tail Lights			
Brake Lights			
Turn Signals			
Emergency Flashers			
License Plate Light			
Back Up Light			
Back Up Alarm			
Wiper Blades			
Wiper Operation			
Foot / Hand Brake			
Horn			
Seats			
Seatbelts			
Shoulder Harness			
Seat Latching			
Rearview Mirror			
Side Mirror(s)			
Radio Mounts			
CAP Added Wiring			
Fire Extinguisher			
First Aid Kit			
Spare Tire			
Tire Tools			
Proof of Insurance			

Comments:

Under Hood Inspection

Item	Sat	Unsat	Comment
Battery Condition			
Brake Fluid			
Exhaust System			
Oil Quantity			
Coolant Quantity			
Belts/Hoses			

Exterior Inspection

Item	Sat	Unsat	Comment
Body Condition			
Paint Condition			
Door Operation			
Door Condition			
Window Condition			
Window Operation			
Bumper Condition			
Tire Condition			
Tire Wear (Min 1/16")			
Tire Inflation			

Driving Check

Take Vehicle to Highway Speed and Check for Safe and Satisfactory Operation

Item	Sat	Unsat	Comment
Steering			
Braking			
Suspension			
Drive Train			
Alignment			

Trailer Inspection

Item	Sat	Unsat	Comment
Running Lights			
Brake Lights			
Brake Condition			
Hitch Condition			
Safety Chain			
License Current			
Tire Condition			
Door Latch Condition			