

**ACFR**

**Small Unmanned Aircraft Systems**

**Mission Statement:**

The deployment of small Unmanned Aircraft Systems, (sUAS), by Alachua County Fire Rescue, (ACFR), and the Alachua County Board of County Commissioners, (BOCC), is expected to assist ACFR and the BOCC as a force multiplier, providing increased situational awareness, improved cost operating efficiency, enhanced employee and public safety. It will enhance employee and public safety by improving emergency response through the assessment and implementation of emerging technologies that have the ability to provide a video-audio recording and streaming, photographs, maps or an aerial overview of any incident, event, or mission task as assigned.

Deployment of the sUAS asset will assist departments, (governed by the BOCC), and/or other outside agencies, with prior approval of the Fire Chief or his/her designee.

Services rendered to our customers and community will always be done in an expeditious manner and, as much as possible, available on a perpetual basis.

We seek to enhance any mission through knowledgeable use of the latest unmanned aerial technologies, adherence to aviation protocols, and a continual deployment readiness.

As with all missions conducted by ACFR, sUAS activities will be conducted in a manner ensuring individual privacy and safety, in accordance with applicable Federal, State, and local laws.

**Purpose:**

To provide a Department wide standard for the use of sUAS, within ACFR, Emergency Management, (EOC), the Office of E911, other BOCC Departments and outside agencies as approved by the Fire Chief or his/her designee.

**Disclaimer**:

This guideline is not intended to create or enlarge the employer’s/employee’s civil liability in any way. It shall not be construed as a creation of a higher standard of safety or care in any evidentiary sense on third-party claims insofar as the employer/employee’s legal duty imposed by law.

**Scope:**

Applies to all employees’ who utilize sUAS or the data gathered as part of their job duties and/or assignments while conducting sUAS missions. It also applies to all sUAS utilized by ACFR, which may have the following capabilities:

* Photography and/or video-audio streaming and/or recording
* Thermal imaging
* Chemical/Environmental monitoring
* Mapping
* Deployment of rescue or other equipment

Data gathered during the operation of any ACFR sUAS is the property of ACFR. Data shall be stored, retained or deleted only as authorized by the Fire Chief or his/her designee, but may be used for training and/or review of any incident in order to critique the incident and improve actions taken or develop changes to current tactics and plans.

Any data collected for another agency or Department may only be released to that organization with prior authorization of the Fire Chief or his/her designee. Once that data is released to the other Department(s) or agency ACFR will have no obligation to retain the records/data unless otherwise specified in this document or the sUAS Team Standard Operating Procedures, (SOP’s).

**Background:**

sUAS’s are a rapidly evolving technology that generally consist of an unmanned remotely operated aerial vehicle with on board video/photographic equipment or other sensors. This policy outlines the process for sUAS use within ACFR, EOC, E-911 and/or other BOCC Departments or request for use of the sUAS Team by outside agencies/entities as approved by the Fire Chief or his/her designee.

ACFR currently employs a quad-copter type sUAS with a high definition camera(s) capable of displaying HD images to a ground control station. The sUAS has software safety imposed flight limitations with “return to home”, (RTH), features in the event of lost communications with the sUAS.

The Federal Aviation Administration, (FAA), is periodically updating their rules and regulations for the use of sUAS. The Department will engage in the use of sUAS following the tenants of the proposed sUAS rules and regulations related to this equipment.

ACFR shall ensure that sUAS operations requiring a Certificate of Authorization (COA), from the FAA are met.

ACFR will train individuals on the sUAS team in the safe operation of the sUAS utilized by the Department to include requiring those individuals to pass an aeronautics test, Part 107, Remote Pilot Airman Certificate, and be vetted by the Transportation Security Administration, (TSA), but a certificate wouldn’t require the flight hours or medical rating of a private pilot’s license. Further training requirements may be imposed as set forth in the SOP’s for the sUAS team, the Programs Manager or this document.

**Guidelines:**

ACFR sUAS Team shall meet FAA size requirements to operate legally during emergency situations as declared by the on scene commander or their designee. The area of operation is limited to the incident or mission assigned unless there is a search for a lost person(s) or other operations requiring the sUAS to operate out of the visual line of sight, (VLOS), of the operator. Any non-emergent missions conducted for other BOCC departments, or outside agencies, will be conducted with prior authorization from the Department head and the Fire Chief or their designee in accordance with the COA and/or FAA Part 107 guidelines.

**Responsibilities:**

All personnel who will use the sUAS must be properly trained and have achieved technical proficiency in the utilization of the equipment prior to its use, with the exception of technical training and internal certification efforts.

All Remote Pilots in Command, (RPIC), must possess a FAA Part 107 certification, and at least one RPIC must be present for all missions and training. To the extent possible, training related to the sUAS should include hands on scenario based training, including the examination of circumstances in which the sUAS should or should not be placed into service.

ACFR sUAS members will always take into consideration the preservation of privacy and is used within the guidelines set by the FAA and the State of Florida. Reasonable precautions are to be taken to protect the privacy of the businesses and residents of Alachua County, or any area in which a mission is conducted, and the data collection is only utilized in a manner that assist in increasing safety of the organization or general public unless the mission task are related to any non-emergency use. Due consideration towards the privacy of individuals is exercised during the decision to launch, or not launch, however minimizing immanent hazards to human life as well as mitigation of any hazards takes precedent. Unauthorized use of any of the sUAS, or the data collected, will result in strict accountability.

**Accountability:**

ACFR promotes accountability by requiring all personnel to accept responsibility for the decisions and actions undertaken, and to evaluate the potential consequences of those decisions and actions. ACFR and the BOCC imposes codes of conduct to guide its employees in the decision making process. As with the use of any technology, there must be policies and guidance for the utilization and oversight, along with procedures to hold the organization and its employees accountable. The senior accountable officer or team member present is ultimately responsible for activities and performance of the organizations employees, as well as the operation of the sUAS and its program management.

Part of accountability is ensuring that all sUAS team members are appropriately trained and supervised. ACFR personnel whose responsibility it is to manage, supervise, maintain, fly and/or otherwise use sUAS must receive training on sUAS operations, data management, data storage, data processing, mission readiness, this policy and the underlying policies incorporated within the sUAS program, ACFR and the BOCC.

**Training:**

Operators of the sUAS equipment shall be trained to safely operate and maintain the sUAS equipment. sUAS operators shall have instructions on individual rights and liberties and shall fully understand the laws protecting those rights. There shall be a written examination and flight operations test prior to being allowed to operate the sUAS on any mission. Instruction on data management, processing and storage will also be reviewed, and proficiency measured, by the sUAS team manager/supervisor.

**sUAS Uses:**

* **Interdepartmental:**

The response time, currently, for the sUAS asset is 45 minutes to 1 hour. Early determination of the need for sUAS assets would reduce the delay in the arrival of the team/asset. The following demonstrate the most common situations, (but is not all inclusive), that Fire-Rescue personnel would encounter to initiate a request for the sUAS asset to respond to a scene:

* Aerial observation of a wild land or large commercial fire.
* Aerial recording of damage sustained post disaster, (i.e. Tornado, Hurricane, Flooding).
* Aerial reconnaissance of a hazardous materials event.
* Aerial recording of any training events
* Search and Rescue, (SAR), operations
* Any situation where the incident commander deems aerial reconnaissance would benefit the safety of fire fighters, responding personnel, or the public.
* Aerial mapping operations
* Other missions as required by the Department or incident

Request for the resource should be made through the Combined Communications Center, (CCC).

The decision to actually launch, or not to launch, rest with the RPIC and is contingent upon several factors including the ability of the team to operate within a secure perimeter, physical features of the area, obstructions, terrain and the weather. Other considerations include, but are not limited to, the safety of the sUAS team and the structural integrity of the area being surveyed.

* **Other BOCC Department Request:**

Other BOCC Departments may request the use of the ACFR sUAS Team through their Department Head. Once the Fire Chief or their designee has approved the request, the sUAS team assigned will evaluate the mission and determine if it is safe to fly and if the data requested can be provided. The decision to actually launch, or not to launch, rest with the RPIC and is contingent upon several factors including the ability of the team to operate within a secure perimeter, physical features of the area, obstructions, terrain and the weather. Other considerations include, but are not limited to, the structural integrity of the area being surveyed, the safety of the sUAS team and equipment, weather, etc. All data gathered and processed would be turned over the Department Head that oversees the requesting department. ACFR will not retain any of the data once it has been released to the requesting Department/Agency unless it is deemed that the data obtained has value as a training tool for future use or as otherwise specified in this document or the sUAS team SOP’s.

The request from all other BOCC departments are subject to the terms of this document and the sUAS teams SOP’s and require written acceptance of such including provisions relating to retention, storage, access to and sharing of data.

The following examples are some possible request for use and are not all inclusive of the ACFR sUAS teams mission capabilities:

* Aerial mapping
* Roof inspection
* Property inspection
* Tower inspection
* Damage assessment
* Multi-story building inspections
* Infra-structure inspection
* Major construction progress inspections
* Press release footage or photographs
* Elevation studies
* 3D mapping
* ASO over-watch during tactical situations
* Public Relations

**Outside Agency/Department Request:**

The Fire Chief or their designee must approve all requests from any outside agency, organization or department.

Once the request has been approved the sUAS team assigned will evaluate the mission and determine if it is safe to fly and if the data requested can be provided.

The decision to actually launch, or not to launch, rest with the RPIC and is contingent upon several factors including the ability of the ream to operate within a secure perimeter, physical features of the area, obstructions, terrain and the weather. Other considerations include, but are not limited to, the safety of the sUAS team and the structural integrity of the area being surveyed.

**sUAS Team Operation Procedures:**

**System Storage:**

The sUAS and all support equipment, (spare parts, battery chargers, folding tables and chairs, radio equipment, sUAS aircraft, monitors, etc.), will be securely stored and maintained in an appropriate location at ACFR HQ for timely portability and deployment. Consideration should be given to the storage and transportation of sUAS batteries. The individual assigned to the management of the sUAS team will be responsible for all program equipment and will ensure said equipment is labeled, coded and recorded in accordance with ACFR and BOCC policies.

**System Transportation:**

The sUAS and all support equipment should be stored into a case(s) that can be easily carried and will protect the contents from excessive loads during transportation. The sUAS may be transported via department ground vehicles, aircraft or other or other methods with supervisory approval.

Prior to transporting the sUAS for deployment, the crew member(s) responsible for transport will ensure that all necessary equipment is loaded by reference to the approved sUAS Equipment Checklist.

**Mission Readiness:**

In order to ensure that ACFR sUAS operations remains fully mission ready, all of the policies and procedures within this operating document shall be complied with. The following operation standards address most, but not all, of the operational protocols for the safe sUAS deployments:

* sUAS operation for training and proficiency may be conducted under 14 CFR Part 107. Whenever such operations are conducted, the RPIC will place a statement in the remarks of the Flight Log and in the AirData software stating that the flight operations were conducted under that operating standard. All operational missions, planned or emergency responses, will be conducted under a COA issued from the FAA or under 14 CFR Part 107.
* The programs manager or a supervisor should approve all training, demonstrations, and task specific or public safety missions. All flight operations should be conducted in accordance with the manufacturer’s recommendations and department policy and procedures.
* Only personnel, both pilots and crewmembers, who have been trained and certified in the operation of the system, will operate ACFR sUAS. All personnel with sUAS responsibilities will be provided training on the policies and procedures governing their use.
* All flights will be properly documented in the flight log and the sUAS Flight Log record software, (AirData), designed for that purpose and all flight time accounted for in the log and software. The purpose or reason for the flight, name of the RPIC and authorizing supervisor will also be documented.
* Except for those instances where safety could be jeopardized, the department should consider using a “Reverse 911” telephone system to alert those living and/or working in the vicinity of the sUAS operations, if deemed necessary. This will not only provide an increased level of safety should the sUAS make an uncontrolled landing, but may lead the public alerted to provide further information of a growing incident.
* Prior to take off the sUAS should be programmed to RTH if the command and control, (C2), signal is lost for the specified period of time. In the event of a C2 interruption with the sUAS, lost link procedures should be executed with the immediate landing of the sUAS.
* When the sUAS is deployed to meet an approved mission task, it should be recovered within the same general area, if possible.
* A designated safe area of at least 25 feet diameter should be maintained during takeoff and landing evolutions. No personnel, except the sUAS flight crew, shall be within that safe area during those operations.
* sUAS operations will be conducted during daylight hours unless night operations are approved in the ACFR COA or authorized under a waiver for 14 CFR Part 107 operations. If due to exigent circumstances, night operations are necessary the RPIC should contact the FAA System Operations Support Center, (SOSC), to request a Special Government Interest, (SGI), approval.
* The RPIC shall make every effort to ensure that flight operations will not pose any undue risk to the personnel directly involved with the mission. The RPIC has the final authority concerning the safety and flight of the department sUAS. The RPIC shall have final determination of the risk to the public and authority over any launching of the sUAS. In all cases, the sUAS should not be flown over nonparticipants and/or property in a manner that is in violation of the FAA regulations and/or the approved COA.
* If, at any time, the RPIC and/or the Visual Observer(s), (VO), believe there is a potential for air-to-air conflict, collisions, risk of harm/injury to persons or property, the RPIC should abort the flight and immediately land the sUAS. When the hazard has been resolved/mitigated, the flight operation(s) may resume. The use of sUAS should address risk management, minimum crew rest, maximum crew mission hours and the associated elevation of approval levels if waivers to these rules are requested.
* Any sUAS operations expected to be conducted within controlled airspace, or in close proximity of an airport, should require coordination with the airport operator and/or FAA approval through the provisions of the COA or through the FAA SOSC.
* sUAS flight operations should not be flown within unsafe distances to any building, structure, tower or person, except when the risk of a collision and loss of the sUAS is outweighed by the need to obtain critical information needed to stop a threat, save a life or mitigate a hazardous situation.
* Weather is a critical issue for safe operations. A local source of weather may be utilized, the Internet or phone application, or may be observed onsite. The sUAS should not be flown outside the approved/authorized weather minimums identified by the manufacturer or the restrictions of 14 CFR Part 107, or the departments approved COA by the FAA. The RPIC shall have the final determination of risk due to weather and authority over any mission.
* Unauthorized use of an ACFR sUAS could result in disciplinary actions.

**Flight Operations**

**Normal Procedures**

**Pre-Flight:**

A preflight check of the sUAS utilizing the appropriate checklist shall be conducted before each mission. The checklist should incorporate the manufacturer’s recommendation and applicable Federal Aviation Regulations, (FARs). The RPIC shall conduct a preflight crew briefing before every mission to ensure duties, responsibilities, mission objectives, hazards, weather and any information deemed necessary is clearly conveyed to the sUAS team.

**Communications:**

All radio communications required by the FAA will be complied with. Communications with sUAS team members, CCC and the on scene commander during operations will be limited to operationally necessary communications in order to minimize disruptions of the RPIC and team members. Federal Communications Commission, (FCC), ground station licenses may be required by the FCC for state and local agencies and authorizations may be required from the National Telecommunications & Information Administration, (NTIA), for federal agencies.

**General Procedures:**

1. The sUAS should be operated in accordance within manufacturer specifications and applicable FAA limitations and restrictions.
2. Care shall be taken in the operation of the sUAS to avoid flying over persons or property that could result in injury or damage whenever possible.
3. A copy of the current valid COA, if the operation is under the COA, shall be present whenever sUAS operations are conducted.
4. The lost link response should be set to the home point and the altitude set in accordance with the altitude limit of the COA or as regulated by 14 CFR Part 107, depending on what authority the operation is being flown.
5. For all operations, the VO shall utilize a distance from the sUAS that will adequately permit them to maintain a visual observation on the sUAS and maintain personnel safety.
6. All sUAS team members should comply with all limitations, restrictions and requirements as enumerated in the COA or as directed by 14 CFR Part 107. The PIC will function as team leader and the operator of the sUAS. The PIC is ultimately responsible for the operation and safety of the sUAS mission and is solely responsible for the input of commands/piloting of the sUAS during flight.
7. The RPIC shall be responsible for the system assembly, setup, preflight, operations, post-flight, disassembly, storage and paperwork for each mission assigned to them. The designated VO(s) and other personnel, as assigned, can assist the RPIC in the completion of these activities.
8. The RPIC, Team Leader or Air Boss, dependant on mission, shall be responsible for contacting the FAA in order to publish the applicable Notice to Airmen, (NOTAM), prior to the mission if required.
9. An Air Band Radio, (Victor Radio), should be part of the sUAS crewmembers kit in order to communicate with or monitor the local controlling Air Traffic Authority, or other aircraft if operating nearby an active departure or arrival facility. Additionally, the ability to communicate with low flying first responder aircraft for airspace de-confliction will be increasingly important as sUAS and other low flying aircraft presence will continue to increase at some incidents.
10. The sUAS should operate with position navigation or anti-collision lights at all times.
11. No RPIC of a civil aircraft may allow any object to be dropped from that aircraft in flight that creates a hazard to persons or property. However, this section does not prohibit the dropping of any object if reasonable precautions are taken to avoid injury or damage to persons or property, (FAR 91.15).
12. The RPIC shall obtain and record the most up to date weather forecast for the area of operation.
13. The RPIC shall conduct a pre-mission briefing to ensure all crewmembers and support personnel are fully informed about all aspects of the mission to include, but not limited to, the purpose of the mission, the Defined Incident Parameters, (DIP), the weather, any flight hazards or other safety issues and any special coordination concerns.
14. All sUAS operations should be conducted at less than 400 feet above ground level, (AGL), or within the limitations of the departments COA.
15. The operating guidelines related to ambient temperature are stated in the manufacturer’s flight operations handbook. The battery and flight duration may be adversely affected based on high humidity and temperature.
16. The sUAS should not be operated in sustained winds greater than the manufacturer’s recommendations. The RPIC may decide that wind conditions in the operations area are too hazardous and opt not to fly.

**Post Flight:**

A post flight check of the sUAS will be completed in accordance with the manufacturer’s recommendation and applicable FARs utilizing the Post-Flight Checklist. The sUAS shall the be prepared for redeployment or for disassembly and storage

**Emergency Procedures:**

Emergency procedures are typically stated in the manufacturer’s flight manual. They may be detailed or very brief. In any case, the manufacturer’s specified emergency procedures should be complied with for all sUAS operations. The department may choose to add additional amplifying information to add to clarity and an explanation for the published emergency procedures. The department may also add emergency or abnormal procedures to a checklist to address issues not covered by the manufacturer.

1. **Loss of Flight Control, (Lost Link), RTH**

The sUAS lost link procedures should be set to enable the sUAS to climb to its programmed maximum ceiling altitude and then return to and land at the launch site. An emergency procedure checklist should be developed for each sUAS platform operated by the department.

The initial procedure in any lost link condition is to verify the status of the power on the sUAS and the Ground Control Station, (GCS), and to adjust the antennas in order to get the optimum line of sight to the sUAS. If positive control of the sUAS cannot be re-established and it is leaving the area of operations, (fly away condition), or the sUAS poses a risk to life, and/or property, the RPIC will attempt to issue a RTH command to the sUAS, (this command should self initiate on some sUAS), and if no response from the sUAS within a reasonable period of time, (regained the link), then the RPIC will issue an Engine Kill command, (if a feature of the sUAS), and should immediately notify the local ATO facility providing the location and circumstances, last known direction of flight, altitude and the registration number of the sUAS. The RPIC will then immediately inform the chain of command and the sUAS Program Manager, or designee, providing all details needed and complete the appropriate situation report.

1. **Loss of Visual Contact**

If the visual contact with the sUAS is lost during any mission, the RPIC should command the aircraft into a hove mode and the RPIC and VO shall try and re-establish visual line of sight, (VLOS), within a reasonable amount of time, as determined by the RPIC, the RPIC shall execute the RHT command to the sUAS to attempt to reacquire visual contact. If the RPIC and VO are unable to reacquire the sUAS, the flight should be terminated. The RPIC will make immediate notification to the sUAS Program Manager or designee.

1. **Loss of GPS Signal**

Should the sUAS loose the GPS signal during autonomous operations, the RPIC must immediately take manual command of the sUAS and land as soon as practical. If positive control of the sUAS cannot be maintained and the sUAS is leaving the operations area, or the sUAS poses a risk to life and/or property, the RPIC will issue an Engine Kill command, if equipped. If the sUAS is not located, the RPIC should immediately notify the local ATO facility providing the last known location, direction of travel, time and remaining battery and complete the necessary situation report. The RPIC will make notification to the sUAS Program Manager or designee.

1. **Loss of Power, (Motor Failure), sUAS Forced Landing, (Crash)**

In case of a motor failure or loss of battery power, the sUAS cannot maintain flight. The RPIC will immediately notify the chain of command, Health and Safety Officer, Risk Management and the sUAS Program Manager or designee, note the location and time of the mishap and then, together wil supporting crewmembers will attempt to locate and recover the sUAS. The RPIC shall assess the impact site for injuries, and render aid as needed. The RPIC shall take pictures of the sUAS at the impact site, record the location, time and complete the necessary Supervisors Accident/Injury report along with a situation report.

1. **Lost Communication with VO(s) or Incident Command**

* RPIC and VO(s)

If the VO(s) is distant, and not within normal speaking range of the RPIC, the RPIC and the VO(s) shall use communications devices for continuous communications that are NOT on the tactical frequency at the scene of an incident. In the event the RPIC loses communications with the VO(s), the RPIC will immediately land the sUAS, if safe to do so, until communications can be regained. In all cases, when during loss of communications there is concern for people or property in the air or on the ground, the RPIC will immediately land the sUAS if safe to do so. Once communications with all crewmembers is re-established the mission may resume.

* RPIC and Air Traffic Control, (ATC)

If required the RPIC will communicate with the ATC through the use of a two-way “Victor Radio” or a cellular phone based on the agreement between ATC and the RPIC. In the event the RPIC is unable to establish communications, the RPIC will immediately land the sUAS until communications can be regained. In all cases, when during loss of communications there is concern for people or property in the air or on the ground, the RPIC will immediately land the sUAS. Once communications with ATC is re-established, the mission may resume.

**Mission Callouts/Request**

There are generally four types of mission callouts/request for which the department may deploy its sUAS Team:

1. Inter-Departmental, (Emergency or Non-Emergency)
2. BOCC Department Request
3. Demonstration/Public Education Request
4. Outside Agency Request

All request for the deployment of the sUAS will be coordinated through CCC and/or authorized by the appropriate supervisor as outlined previously in this policy.

A mission should be planned prior to the flight unless emergent situations exist and the mission needs to be conducted posthaste. The RPIC will then proceed to set up the mission by reviewing the weather, location, type of incident and personnel to support the mission, (VO, camera operator, data manager, Air Boss, etc). The RPIC is responsible for completing the flight log and any other required documents. No mission will be flown without authorization from the appropriate supervisor. The RPIC is authorized to evaluate the mission, coordination required, and risk factors and accept or decline any mission request or portion thereof. The basis for declining a specific mission should be communicated to the requesting personnel, department or agency. Additionally, the sUAS pilot declining the requested mission should document the reason(s) for declining the mission and notify the sUAS Program Manager or designee. The sUAS Program Manager and/or RPIC considerations for authorizing deployment, when appropriate, include, but are not limited to the following:

* The location of the mission for purposes of ensuring the safety of people, personnel and property.
* DIP: personnel must secure the DIP to prohibit civilian traffic or interference and protect responding assets at the scene during flight operations.
* The weather and its potential effect on the mission.
* The potential usefulness of the information gathered.
* Any other relevant risk factors to successfully complete a risk benefit analysis for the use of a sUAS in the specific mission.
* Operational Area Risk Review, (OARR): The RPIC and VO are responsible for identifying all ground and flight hazards at the scene, (infrastructure, buildings, smoke, trees, bushes, power lines, towers, or other potential obstructions) and coordinate the preflight briefing accordingly. The flight team should identify cell towers, TV and microwave sources which may interfere with the flight equipment. The equipment should be tested on the ground to ensure proper communications and operations before flight.
* Take-off and Landing Site: This area should be free from obstructions, items on the ground and debris that may interfere with the rotors. This includes creation of flight line/launch and recovery zone from which all personnel must remain clear.
* Documentation: A copy of the current COA, flight log(s) and pilot certification(s) must be kept with the sUAS at all times. At the conclusion of each mission, the RPIC will be responsible for completing all of the mission documentation and reports.

**Take off and Landing Zones:**

The selection of an appropriate launch site demands careful attention to may factors. The selection of a suitable site shall be driven by safety first and foremost. Considerations for the selection of a suitable launch site include, but are not limited to the following:

* The launch site ensures sUAS departures are not over populated areas.
* The ability to remain within the DIP and maintain an adequate buffer zone between the sUAS and responding personnel. The RPIC should maintain an adequate buffer between the launch and recover operations and all responding non-sUAS personnel. The RPIC may designate an individual as a Safety Officer to ensure the safety and security of the launch and recovery area.
* Coordination and communications between crewmembers and the on scene commander, if one is present for the assigned mission.
* The operation area selected by the sUAS team should be located within a secure perimeter whenever possible. The area should be evaluated for adequate space and clearances in order to safely assemble, launch and recover the sUAS. Attention should be given to overhead obstacles and obstructions that may pose a risk to the sUAS operations. The site selected and utilized by the sUAS team should be restricted and access granted to personnel for operational purposes only. The site should allow for long duration sUAS operations free from access to casual observers and noninvolved personnel, which can become a significant distraction.

**Alternate, (Emergency), Landing Sites:**

Typically the primary landing area shall be the same as the launch site. The RPIC has final authority for any approaches to the primary landing site and may wave off any approach deemed unsafe, the alternate landing site should then be utilized if needed.

The RPIC should designate at least one alternate landing site. In the event that the primary landing site is deemed unsafe or any other reason determined by the RPIC cannot be used for returning sUAS the alternate landing site should be utilized.

The RPIC may optionally designate an “abortive flight site” whereby the sUAS flight may be terminated in an emergency situation. This site should be clear of people and structures as to limit the risk should the sUAS be required to vacate airspace in an emergency. Should the RPIC deem the necessity of terminating the sUAS flight, the sUAS may be flown to this site and the flight terminated.

An adequate safety buffer should be established between the sUAS takeoff and landing area, and people no specifically involved in the sUAS flight operations.

**Prohibited Acts:**

* Unauthorized use, or use inconsistent with applicable law(s) of sUAS operation, could result in disciplinary actions and/or civil and criminal penalties.
* The sUAS shall not be operated in violation of applicable law(s)/regulation(s).
* The sUAS should not be flown in conditions that exceed the manufacturer’s recommended limitations to include range, ceiling, wind strength and battery charge.
* The sUAS shall not be flown for any mission that the RPIC determines the risk of flying the sUAS outweighs the benefit of the mission. Risks may include hazards to individuals, property on the ground, possible collision hazard with other aircraft and loss of control of the sUAS. The RPIC has sole discretion and responsibility for the safety of the flight/mission.
* The sUAS is prohibited from carrying any hazardous materials.
* sUAS flights are prohibited in Class B airspace without appropriate FAA Emergency COA authorization and should not exceed a 400 foot ceiling without prior approval from the FAA ATO authority.
* A single control station and pilot should fly only one sUAS at a time. This guidance is not intended to prevent two, or more, sUAS, with available technology, relieving the primary sUAS station or operating in the same DIP when the need arises for over-watch or multiple sUAS missions within the same DIP.
* sUAS operations are prohibited when other manned aircraft are operating within the DIP unless appropriate safety margins of altitude separation, (de-confliction of airspace), can be established and maintained. This type of operation should involve communication with the manned aircraft as coordinated by the RPIC, Air Boss and/or pilot of the manned aircraft.

**Training:**

**RPIC and VO Training:**

ACFR’s RPIC and VO(s) operating a sUAS in support of any mission assigned should first receive appropriate aeronautical knowledge, (“ground school”), training. Following completion of the ground school training the RPIC should complete initial flight training on the specific sUAS(s) they will be flying operationally by a qualified/designated sUAS instructor as determined by the sUAS Program Manager. RPIC’s should comply with these SOP’s and remain current in order to be available for flight operations. The RPIC’s will maintain a working knowledge of the operational airspace, risk management policies and procedures, and the ability to obtain appropriate weather forecast and conditions, and the filing of NOTAM’s for the area of operations.

All RPIC’s shall be familiar with the departments COA, applicable aviation regulations, and maintain proficiency in their operator and observer abilities. All RPIC’s must complete and document all flight training and mission flight time to maintain their sUAS currency, both as part to the departments COA or as required by the operator’s FAA Remote Pilot Airmen Certificate, Part 107. RPIC’s who do not, or cannot maintain currency shall complete a proficiency flight check before performing any pilot duties during an operational mission. Repeated failures to maintain proficiency will result in removal as a remote sUAS pilot.

Qualifications and training consist of, but are not limited to, the following:

* Basic Aeronautical and Flight Operations Training. All RPIC’s must successfully complete and pass the Remote Pilots Airmen Certification Exam, administered by the FAA under 14 CFR Part 107, and Initial Flight Operations Training, (conducted by the department), as designated by the sUAS Program Manager or designee.
* Mission Training. All RPIC’s must also undergo Mission Training Exercises held on a routine basis to increase the core competencies. These scenario focused training events will include operations of the sUAS, crew coordination, and communications, VO and Safety Officer duties along with data processing or transmission of mission data as applicable to the scenario.
* All RPIC’s must complete/log a minimum of three qualifying sUAS flights, to include takeoffs and landings, in the preceding ninety days to be eligible to act as a RPIC during an operational mission.
* If a sUAS RPIC has not maintained currency in the sUAS, as described above, they must notify the sUAS Program Manager or designee and will not be eligible to operate the sUAS as the RPIC, (except for training purposes), until they regain currency. In order to regain currency as a RPIC, the individual has sixty days to fly the three-takeoff/landing flights. These flights should be observed and supervised by the sUAS Program Manager or designee who will verify competency in the flight of the sUAS.

All RPIC should participate in any scheduled training regarding sUAS operations. Training should include both aeronautical knowledge and flight training. Training should not be limited to actual RPIC/VO skills, and should include a review of all pertinent sUAS and related aviation matters.

Just like the RPIC the VO supporting any mission should first receive appropriate training. VO’s shall comply with these SOP’s and should maintain a working knowledge of the operational airspace, risk management policies and procedures, and support the crew coordination of the mission. Unless an exigent circumstance exists, at least one VO shall be assigned for all training and operational sUAS missions. Additional VO’s may be necessary at the discretion of the RPIC.

For initial training the VO’s should be familiar with the specific operations parameters of the sUAS being used. VO’s should also train with the RPIC to ensure proper crew resource management. Communications between the RPIC and VO should be practiced so that the VO will provide necessary information, (hazards to flight, possible ground or weather issues, etc), to the RPIC in a way that does not distract the RPIC and their operation of the sUAS. The VO should have a current working knowledge of the airspace intended for operations to determine potential risk to the sUAS flight. The VO should have the ability to obtain and interpret operational weather conditions to determine the risk to the sUAS mission.

**Training Locations:**

sUAS training events should be conducted at a site designated and approved by the department and/or sUAS Program Manager or designee. The location should be in a somewhat remote area that is clear of flight hazards, people, infrastructure and airports.

**Maintenance Procedures:**

sUAS team members will learn about the various maintenance issues related to the technology and its support equipment, (battery maintenance, battery storage and safety, sUAS and ground control station software updates and documentation, rotor blade or propeller replacements, etc.), as recommended by the manufacturer or designated by the sUAS Program Manager or designee. They will carry out all scheduled and unscheduled maintenance activities and document all maintenance as instructed by the sUAS Program Manager or designee.

The department will ensure that a spare toolkit and parts are available for deployment to allow sUAS operators and crewmembers to remedy minor maintenance issues in the field, (tightening loose screws, replacing antennas, changing rotor blades, etc). If a malfunction exist that cannot be repaired locally, the sUAS will be shipped back to the manufacturer or vendor for repair as appropriate. Accurate and complete maintenance logs serve to validate the service history and airworthiness of the sUAS.

All malfunctions and/or repairs in the field or during a mission will be reported to the sUAS Program Manager or designee via email and recorded in the flight log for that sUAS.

**Batteries:**

Electric powered sUAS technologies will typically use Lithium ion battery packs. Lithium ion batteries have exhibited several documented risks for fire or explosion if not properly handled, charged and stored. The sUAS batteries should be cycled and stored in accordance with the manufacturers recommendations. These batteries are normally run through a charger on a regular basis to ensure reliable function and immediate operability upon deployment. The charging and cycling of batteries should be documented in a sUAS Battery Log. This log may be electronic in nature and/or contained in the online AirData program. Batteries will be labeled with the date of original receipt, latest charge cycle and a serial number and replaced as, and when, necessary. The department should maintain an adequate number of spare batteries to ensure sUAS operability and mission readiness.

**Data Requirements and Management:**

Proper system maintenance of data management throughout is essential to support a robust safety management process. Maintenance data management is the continuous development and maintenance of processes and procedures to assure that the department has the necessary data in an organized, archived, rational retention scheme. Periodic reviews of such data can support the departments’ use and sustainability through trend analysis.

Unless other wise specified herein, data captured by a sUAS will not be retained and will be destroyed upon the conclusion of the sUAS mission or immediately thereafter. Data collected that is subject to use as evidence of a crime, part of an on going investigation, or required to be retained by law is to be retained subject to relevant governing policies and procedures and is no subject to the data retention policies herein.

As noted above, the department shall only collect, use and disseminate information obtained from sUAS for an authorized lawful purpose. The department shall not retain information collected using sUAS that may contain personally identifiable information for more than the allotted time as specified by the applicable rules, regulations or laws.

Data gathered by the sUAS during a mission may be in the form of live data streaming, video, or still photography. These capabilities may be enhanced with a zoom lens, thermal imaging cameras or chemical monitoring capabilities, all of which are similar in nature to the capability already in use by the sUAS industry standard.

If the retention of the data is necessary or beneficial to the performance of a legitimate, work-related fire-rescue departments function the data will be uploaded and stored on the departments drive and placed into a secure folder that may only be accessed by personnel granted access by the Fire Chief or designee to perform legitimate work-related functions, (training, after action reviews, etc.).

If the data was gathered on a mission requested by another BOCC department or an outside agency, that data will be given to the requesting department or agency and not be retained by ACFR unless it meets the above stated requirements.

sUAS team members will not store, transfer or utilize electronic images or digital imagery for personal use.

The RPIC, VO or Data Management Officer, as designated during the mission briefing, is responsible for electronic data management/handling as well as writing any supporting documentation as required.

Department deployment of sUAS shall continue to be used in a manner consistent with all applicable laws, regulations and policies, including those protecting privacy and civil liberites.

**Operational Risk Assessment, (ORA):**

Overall risk management practices should be adhered to regardless of whether the risk occurring is within the operational doctrine, mission concept, sUAS configuration, pilot training and deployment of the sUAS or the interaction between sUAS subsystems. A vibrant and robust risk management program will enhance mission safety and improves citizen and leadership confidence in the overall program.

Identifying hazards and the risks they pose to sUAS operations is a critical function of risk management and operational safety. Mitigating operational risk to people, (participating or nonparticipating), and property is the responsibility of all sUAS participants, but chiefly the RPIC. If operational constraints, environmental conditions or geographic limitations are insufficient for mitigating the risk to people and property, the mission or operational limitations may be revised, additional design assurances provided, or some combination of actions as specified and coordinated among the responding participants.

**Operational Mitigations:**

These are various methods to eliminate or mitigate existing operational risks from existing hazards. sUAS crew training is a key method of risk mitigation. RPIC and crewmembers abilities to identify hazards are enhanced through training related to flight operations and airspace rules. Through the proper training, RPIC and crews are able to develop the critical thinking required for appropriate response to hazards and an overall attitude of safety. For instance, training in standard preflight activities will lower overall risk as crews conduct disciplined checks and assessments of mission plans in association with current conditions present at the time of each flight.

Likewise, response scenario training will help prepare sUAS members to effectively and safely respond with sUAS support of on scene events. As a result, properly trained sUAS operators know that risk is reduced through mitigations identified during preflight planning hazard assessment. Training may also dictate the level of pilot capabilities and knowledge. For flights conducted at or below controlled airspace, training received from another sUAS operator, an online course, or aeronautical training class may provide the requisite knowledge needed to understand airspace rules, aircraft limitations and operational rules of the sUAS operational environment.

Thorough system knowledge will also enhance pilot and crew capabilities. Knowledge of critical performance parameters of a sUAS, such as maximum command and control link range and lost link protocols, is a precondition for flight. For example, if a directional antenna is used, one may choose to improve the antenna performance by physically pointing the antenna toward the sUAS in a more optimal manner consistent with its design. These practices offer a means to avoid a potential lost link hazard. System knowledge is important in recovering from unusual attitudes and avoiding high-risk maneuvers.

Another mitigation will include predetermined “Mission Go/No-Go Criteria”. Similar to manned aviation, department sUAS RPIC’s and crewmembers shall determine their go/no-go criteria in advance. The go/no-go criteria encompass more than simply assessing sUAS limitations. In addition, pilot capability, awareness of the relevant geography, proximity to people, current and changing weather conditions across the entire flight path and system limitations, among other factors, shape the final go/no-go decision.

Procedural changes in specific flight environments can support operational mitigations on the scene. sUAS RPIC’s and crewmembers may need to incorporate additional operational limitations, flight procedures, maintenance processes, inspections and so forth depending on the flight environment. For example, if a sUAS operates in a particularly harsh environment, the frequency of inspections may need to be increased and additional maintenance performed.

**Common Operational Mitigation for sUAS:**

sUAS crew training is a key method of risk mitigation. RPIC’s, VO’s and other crewmembers abilities to identify hazards are enhanced through training related to flight operations and airspace rules. Through the proper training, various common operational risks can be mitigated and lessons learned may be promulgated. Chief among all training activities is the need for consistent communications and coordination between the RPIC, crewmembers, command and all responders. Training scenarios, (classroom and practical flight training events), should be developed to both enhance flight skills and situational awareness and focus on several anticipated mission sets improves awareness, coordination and risk management.

Personal Protective Equipment, (PPE), will be provided to personnel and be appropriate for the mission(s) they are responding to.

**Safety Policy:**

During sUAS operations the safety of all people is the number one priority of the sUAS team. It is the responsibility of the RPIC and all sUAS team members to assess all hazards within the DIP that could pose a potential safety risk, and to den launching of the sUAS or terminate a flight when it is clearly unsafe to continue. The RPIC shall bring safety related issues to the attention of the on scene commander, if exist, and the other team members when any condition exists or develops that becomes a safety concern, including the safety of persons and property on the ground. It should be understood and acknowledged by all participants that the RPIC is the sole and final authority regarding the safe operation of the sUAS.

Except for department personnel or other authorized persons as required by the mission, all sUAS team members will ensure that no persons are in the vicinity of the sUAS during operations. Under no circumstances shall sUAS operations be conducted directly over large gatherings of people or operated from a moving vehicle.

Except for the purpose of training or with specific supervisory approval, only sUAS personnel who meet the training and qualification requirements in this policy will be permitted to act as a team member.

The designated RPIC is authorized to evaluate and accept or decline any sUAS mission or portion thereof for which the safe completion of the mission is in question. Supporting VO’s and other team members are expected to assist the RPIC with that mission evaluation and contribute mitigation strategies or issues that are relevant to the RPIC making a valid risk-based decision. All sUAS team members shall comply with the sUAS operators’ manual, warnings, limitations, placards and/or mission checklist at all times unless an emergency dictates otherwise.

**Mishap Reporting:**

Any time abnormal circumstance, event or mishaps occur before; during or after any sUAS fight the RPIC is responsible for notifying the sUAS Program Manager or designee and completing the mishap report notification documentation. The RPIC shall be responsible for notifying the department for any mishap involving injury or damage to property or the sUAS during any sUAS mission, (training or operational). In the case of a serious mishap where injury, damage, forced landing or other serious emergency occurs, the RPIC shall be responsible for reporting and recording the mishap in accordance with department and FAA reporting requirements. The sUAS team will develop the mishap reporting form that includes appropriate telephone numbers and contact information. The department shall retain and make available to sUAS team personnel the mishap reports so that appropriate lessons learned might be derived for every event with the intention to prevent reoccurrence.

**Mishap Action Priority:**

Immediately following any incident/accident, all efforts will be focused on:

1. Minimizing any other risk to life or property.
2. Rescuing and caring for the injured
3. Contacting emergency services, (Fire, EMS, LEA, etc).
4. Securing the mishap location from unauthorized entry.
5. Completing the initial notification to the sUAS Program Manager or designee.
6. Recording as much information as possible for the mishap report.
7. Notify the FAA and/or the National Transportation Safety Board, (NTSB), if required.

**Mishap Investigations:**

sUAS supervisory personnel utilizing a department Supervisors Accident/Injury Report Form shall conduct an initial mishap investigation. Any follow-up investigation(s) will be conducted by the appropriate agency personnel and shall include a careful review of all mishap reporting information.

**sUAS Damage:**

Any damage to the sUAS or its support equipment shall be immediately reported to the sUAS Program Manager or designee. Any damage to the sUAS or its equipment that is determined to render the system un-airworthy shall be labeled as out of service so as to be visually observable. The sUAS Program Manager or designee will be contacted and advised. The sUAS will remain out of service and appropriately labeled until such time it has been deemed airworthy. A test flight will be conducted prior to the sUAS being placed back into a mission ready status.