

Missouri City Police Department

Policy #: 30-29
Subject: Unmanned Aircraft System (UAS)
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Standards:

I. Policy

The Unmanned Aircraft System (UAS) is a tool to assist the Police Department, Fire Department, Office of Emergency Management, Public Works and any other departments that request mutual-aid in public safety applications such as search and rescue and fire responses. The Unmanned Aircraft Systems used by the Missouri City Police Department are for observation purposes only and are not armed.

II. Purpose

To establish the authorized use and operational guidelines for Unmanned Aircraft Systems (UAS) joint team between the Missouri City Police and Fire Department.

To minimize the risk to people, property, and aircraft during the operation of the UAS while continuing to safeguard the right to privacy of all persons. It is the practice of the Departments to ensure that department employees who operate and deploy UAS assets are Pilots in Command (PIC) as defined by the Federal Aviation Administration (FAA) and have received training on the proper and safe operation of unmanned aircraft.

To define the training and certifications necessary to operate and deploy unmanned aircraft and will establish guidelines and best practices for PICs to follow in order to safely deploy UAS assets. At all times the Department and its personnel shall comply with 14 CFR Parts 107, COA, plus applicable portions of CFR 14 parts 61 and 91; as well as Texas Government Code 423. If

conflicts exist between FAA regulations, Texas Government Code, Texas Administrative Code, and any part of this policy, the most restrictive will apply.

III. DEFINITIONS

- A. Aircraft - A device that is used or intended to be used for flight in the air. This includes UAS.
- B. Airworthiness Statement - The Airworthiness of the UAS is self-certified by the Remote Pilot in Command through a preflight inspection prior to flight.
- C. Crewmember - A person assigned to perform a duty while an aircraft is operating.
- D. Crew Research Management (CRM) - The effective use of all available resources including human, hardware, and information resources and coordination in the use of those resources by the Remote Pilot in Command and Visual Observers.
- E. Division Program Coordinator (DPC) - The individual responsible for assisting in the tactical and administrative functions related to the UAS program, including maintaining a current list of all certified crew members to include Remote Pilots and Visual Observers. The DPC is responsible for maintaining the training records for crew members and compliance with Texas Government Code 423 reporting requirements. The DPC is also responsible for the condition, maintenance, and flight records of the UAS and its associated equipment. For matters concerning the UAS program, the DPC reports directly to the Assistant Chief.
- F. First Person View (FPV) - The Remote Pilot is observing the flight solely through the UAV's camera(s).
- G. Flight Team - Any combination of the RPIC, Remote Pilot or Visual Observer(s). Only the RPIC meets the FAA definition of crewmember.
- H. Flight Time - Remote piloting flight time commences when the aircraft moves under its own power for the

purpose of flight and ends when the aircraft comes to rest after landing.

- I. Image - Means any capturing of sound waves, thermal, infrared, ultraviolet, visible light, or other electromagnetic waves, odor, or other conditions existing on or about real property in this state or an individual located on that property. Imagery may include data about people, organizations, events, incidents, or objects as well as metadata.
- J. Line of Sight (LOS) - The Remote Pilot and/or the Visual Observer can see, unaided, the UAS under their control during flight.
- K. Mission Area of Operations (AOR) - A defined perimeter/parameters to be determined based on the scope and type of the operation and a defined operational ceiling at or below 400 feet above the ground. The altitude of the small unmanned aircraft cannot be higher than 400 feet above the ground, unless the small unmanned aircraft is flown within a 400 foot radius of a structure and does not fly higher than 400 feet above the structure's immediate uppermost limit.
- L. National Airspace System (NAS) - Airspace inside the continental United States. It is further defined through air navigation facilities, equipment and services, airports, or landing areas, aeronautical rules, regulations, and procedures. There are two types of airspace within the NAS, controlled and uncontrolled. Operation of a UAS in controlled airspace adds another layer of responsibilities and requirements that must be met to operate the UAS.
- M. Night Flight - Flight of a UAS that occurs between the hours of one half hour after sunset and one half hour before sunrise. The time of sunset and sunrise are determined by the National Oceanic and Atmospheric Administration (NOAA), but 14 CFR Part 107 will allow small UAS operations to be conducted during civil twilight if the small unmanned aircraft has lighted anti-collision lighting visible for at least 3 statute miles. The night time-operations prohibition in this rule is

waivable through the FAA for Part 107.

- N. Remote Pilot - The individual exercising pilot at the controls over the UAS during flight. The Remote Pilot need not be 14 CFR 107 certified if the pilot is under the supervision of a RPIC who is in direct communication and in a position to take over control of the UAS, regardless of certification. Undesignated remote pilots may be student pilots at the controls.
- O. Pilot in Command (RPIC) - The mission commander with on-site authority for the UAS. The individual solely responsible for the overall flight operations for a specific mission. The Officer may also act as either Remote Pilot or Visual Observer. Regardless, the Officer may not delegate their responsibility. An RPIC may only operate one UAS at a time. Each UAS in use shall have its own RPIC assigned. All RPICs shall be licensed through 14 CFR 107. THE RPIC SHALL BE HELD RESPONSIBLE FOR ALL ASPECTS OF THE MISSION REGARDING UAS OPERATION.
- P. Unmanned Aircraft System / Vehicle (UAS/UAV) - UAS is the unmanned aircraft system and all of the associated support equipment, control station, data links, telemetry, communications, and navigation equipment, etc., necessary to operate the unmanned aircraft. The aircraft's flight is controlled either autonomously by hardware within the UAS or under the remote control of a Remote Pilot on the ground or in another ground vehicle. For purposes of this program, the 14 CFR Part 107 compliant UAS shall weigh less than 55 pounds fully loaded. Maximum groundspeed is limited to 100 mph (87 knots).
- Q. Visual Flight Rules (VFR) - All flights with the UAS shall be conducted under VFR conditions and at an altitude below 400' AGL. VFR is established as a 3 mile visibility and a cloud ceiling of 1,000 feet for day operations and 5 mile visibility with a cloud ceiling of 2,000 feet for night operations.
- R. Visual Observer - The individuals trained to

maintain the line-of-sight and 360 degree hazard awareness around the UAS at all times and assist the RPIC in carrying out all duties required for the safe operation of the UAS. Visual Observers may be formally trained and certified for special operations (formal training is required for night operations), or they may be chosen properly briefed by the PIC (day operations only).

IV. Guidelines

A. Flight Team

1. UAS operations will be conducted by the Flight Team. The Flight Team will consist of at least two members (pilot-in-command and observer). Each member will be assigned a specific role prior to flight.

B. Qualifications and Training

1. All first responder pilots must receive their qualification by successfully completing an approved training course on UAS operations. Within 1 year of completing this training, the UAS pilot should complete the FAA (federal aviation administration) commercial UAS license Part 107 test.
2. To remain proficient, pilots will log a minimum of 15 hours of day flight time and 3 hours of night flight time annually, show a working knowledge of maintenance of the aircraft, and complete a flight proficiency test annually. All flights will be documented in an approved log book.
3. The UAS unit shall meet FAA size requirements to operate legally.

C. Duties

1. Pilot in Command (PIC) - The PIC will function as the team leader and operator of the UAS. The PIC is solely responsible for piloting the UAS in flight. Additionally, the PIC will be

responsible for the assembly, flight preparation, and post flight storage of the UAS.

2. Observer - The observer will maintain a visual observation of the UAS while it is in flight and alert the PIC of any conditions (obstructions, terrain, structures, air traffic, weather, etc.), which may affect the safety of the flight. Additionally, the observer will be responsible for all aviation related communications required by Federal Aviation Regulations (FARS) 91.3. To accomplish this effectively, the observer should be in close proximity to the PIC to ensure instant relaying of information. Direct radio communication with crew is acceptable based on conditions. Additional observers may be necessary.

D. Call-Out Procedures

1. The UAS may be called for numerous purposes for applications by the City of Missouri City, the police department, fire department, or other Missouri City departments that require the use of aerial footage, or mutual-aid with surrounding cities that fall within our COA. When members of the UAS Team become FAA Part 107 certified, members will be able to assist agencies outside of our COA with approval from the UAS program supervisor or division commander.
2. Call outs may include but not limited to: search and rescue of persons, fires or potential fire hazards, major accidents, hazardous material incidents, SWAT operations, assistance with narcotic operations, and assist with patrol functions or declared city of emergency.

E. Safety of Operations

1. The safety of UAS operations is the responsibility of the entire team.
2. Except as required by the mission, all UAS team members will ensure no persons are in the vicinity of the UAS during operations.

3. Except for the purpose of training, only agency personnel who meet the requirements set forth in Section B will be permitted to function as PIC.
4. UAS members will comply with UAS operator manual, warnings, limitations, placards, or checklists at all times.
5. The PIC is authorized to evaluate, accept or decline any mission or portion thereof for the safety of operations.
6. All UAS flights will be conducted in Visual Flight Rules (VFR) conditions.
7. Flight locations are limited by the COA. Unless the pilot has a FAA Part 107 license.
8. Flights within 5 nautical miles of a controlled airport require notification and clearance by control tower and Low Altitude Authorization and Notification Capability (LAANC).
9. Flight operations should never exceed 400' above ground level (AGL), unless an emergency dictates this maneuver and can be safely executed.
10. The Flight Operations Team (PIC or Observer) are not to be distracted and should not be approached by non-flight relevant personnel during UAS operations.

F. Normal Operations

1. The area selected by the UAS team should be secure if possible. The site selected and utilized should be restricted to the personnel involved in operations.
2. The area should be evaluated for adequate space and clearances in order to assemble, launch, operate, and recover the UAS.
3. Attention should be given to overhead

obstacles and obstructions that may pose a risk to the UAS during operations.

4. Flames, smoke, heat, clouds, hazardous materials, and water from hoses are very likely to cause instability in the aircraft, melt/warp blades, cause damage or crash. Avoid hazardous conditions.
5. Area of operations are limited to the incident.

G. UAS Assembly and Use

1. The UAS will be assembled on site by the team according to the manufacturer instructions and guidelines.
2. The observer is required to "double check" the aircraft assembly to confirm that it is assembled properly for flight.
3. Only manufacturer approved batteries and charging units will be used. When possible, fully charged batteries will be used. The aircraft will land as soon as practical when low battery alerts are received.

H. Pre-flight

1. A pre-flight check will be completed according to the manufacturers/ MCPD checklist.
2. Components should be checked to ensure correct operations and security to the craft.
3. If any flight component fails inspection, the UAS is not to be utilized.

I. Communications

1. Loss of Communications between the Pilot in Command and Air Traffic Control:
 - a. If required, the PIC will communicate with

ATC through use of two way radio communications or a cellular phone based on the agreement between ATC and the PIC. In the event the PIC is unable to establish communications, the PIC will immediately land the UA 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 PIC will immediately land the aircraft.

2. Loss of Communications between the Observer and the Pilot in Command:

a. The PIC and Observer will be collocated during operations for this COA and communications will be through direct communication. However, if the observer and the PIC are not collocated, the following communication tools may be utilized.

- i. Hand held Police radio
- ii. Voice actuated headsets
- iii. Cellular phone
- iv. Hand Signals (may be used solely or in conjunction with the communication equipment).

3. If communication is lost and cannot be re-established the UAS will immediately land.

J. Flight Operations

1. General

a. In the event of lost link, the sUAS must initiate a flight maneuver that ensures landing of the aircraft. Lost Link airborne operations shall be predictable and shall remain within the defined operating area filed in the NOTAM for that flight operation. In the event that the UA could potentially enter controlled airspace, the PIC will immediately contact the appropriate ATC

facility having jurisdiction over the controlled airspace to advise them of the UAS's last known altitude, speed, direction of flight and estimated flight time remaining and the Proponent's action to recover the UA.

- b. The sUAS DJI products are preconfigured/programed in the event of a Lost Link condition to stop forward flight and attempt to regain link to the remote operated by the PIC. If the link is not re-established the UA is programed to initiate a Return to Home maneuver. If link is not re-established the PIC will also initiate a manual Return to Home procedure by activation the Return to home function on the UA's remote.
- c. If the link is reestablished the PIC will take control of the UA and maneuver the UA back to the launch location if safe to do so. If link is intermittent the PIC will immediately land the UA in a safe location.
- d. Once the UA has returned to home or recovered, the UA will be inspected for causes of the lost link condition and necessary repairs will be made prior to any future flights.
- e. All lost link events will be documented along with any findings of causes of these lost link events.

- 2. When the UAS is deployed to meet an approved mission task, it shall be recovered within the same general area if possible.
- 3. A designated safe area of at least 25 feet shall be maintained during lift off between UAS's and personnel.
- 4. UAS's should not be flown within unsafe distances to any object or person.

5. Weather -The PIC shall verify the weather conditions in the immediate area of operations. A local source of weather may be utilized, the internet, phone application or may be observed on site. The UAS will not be flown outside the weather minimums identified by the manufacture or the approved Certificate of Waiver/Authorization (COA) by the FAA. The PIC shall have final determination of risk due to weather and authority over any mission.
6. Hazards to the public - The PIC shall make every effort to ensure that flight operations will not pose any undue risk to the public not directly involved with the effort. The PIC shall have final determination of risk to the public and authority over any launch of his/her own aircraft. In all cases, the flying over persons with the UAS we follow FAA regulations and the approved COA.
7. Hazards to property - The PIC shall make every effort to ensure that flight operations will not pose any undue risk to any property in the area involved with the effort. The PIC shall have final determination of risk to the property and authority over launch of his/her own aircraft.
8. Hazards to personnel- The PIC shall make every effort to ensure that flight operations will not pose any undue risk to the personnel directly involved with the effort. The PIC shall have final determination of risk to the public and authority over any launch of his/her aircraft.
9. Proximity to controlled airspace - Operations inside any controlled airspace shall only be performed with the approval of ATC or if a wavier has been issued by the FAA.

K. Launch and Landing Zones

1. Launch Site Selection

- a. Launch site selection shall be driven by safety first and foremost. Selection of

launch sites will be considered based upon:

- i. Ability to maintain adequate buffer zones between aircraft and personnel. The PIC shall maintain a buffer of at least 25 feet for VTOL aircraft between aircraft operations and all non-essential personnel. A designated individual can be identified as a safety officer to ensure the safety of the launch and recovery area.
- ii. Environmental Assessment- No launches shall occur until all environmental assessments have been considered. The PIC has the final authority to abort any launch based upon hazards to the environment, themselves, or other personnel in the area.
- iii. The PIC shall select a launch site that endures UAS departures are not over populated areas.

2. Landing site & Alternate landing sites

a. Primary Landing site:

- i. Typically the primary landing shall be the same as the launch site. The PIC has final authority for any approaches to the primary site and may wave off any approach deemed unsafe.

3. Alternate landing sites:

- a. The PIC shall designate at least one alternate landing site. In the event that the primary landing site is deemed unsafe, procedures to utilize the secondary site will be invoked.

4. Mission Abort Sites:

- a. The PIC may optionally designate an "abort site" whereby the aircraft may be "dumped" in an emergency situation. The abort site shall be

so far removed as to provide absolute minimal risk should the aircraft be required to vacate airspace in an emergency. Should the PIC deem it necessary, the UAS may be flown to this site and inserted without regard to the safety of the aircraft or flight equipment?

5. Landing Safety & Crowd control:

- a. All landing sites shall be maintained and operated as the launch sites. Personnel shall maintain a buffer of at least 25 feet for VTOL aircraft between aircraft operations and all non-essential personnel.

L. FLIGHT OPERATIONS WITHIN 5nm of Towered Airports if no COA:

The following procedures will be completed before commencing UAS flight operations:

1. UAS ceiling set below 400' AGL.
2. Must operate within VLOS/VFR Conditions.
3. Prior to operations within 5nm radius of towered airports, tower will be notified:
 - a. "Tower this is Missouri City (Unit) requesting clearance for UAS Emergency Flight Operations for UAS operating below 400 AGL at () Nautical Miles (Direction) of (Airport identifier)."
 - b. Airport Management - "This is Missouri City (Unit) advising that UAS Emergency Flight Operations for UAS operating below 400 AGL at () Nautical Miles (Direction) of (Airport Identifier) is in progress"
4. ATC radio on.

M. Post Flight Procedures

1. A post-flight check of the UAS shall be completed according to the manufacturer

recommendations.

2. The PIC shall be responsible for completing the log book following each flight.

N. Emergency Procedures

1. Emergency procedures in the manufacturer's operations manual shall be followed for all UAS operations.
2. Loss of UAS Flight Control (Lost Link) - The UAS lost link procedures shall be set for 15 seconds to the rally point response which shall automatically cause the UAS to climb to its ceiling altitude and return to and land at the launch site. If positive control of the UAS cannot be maintained and the UAS is leaving the operational area or the UAS poses a risk to life and/or property, the PIC will attempt an engine kill command.
3. Loss of Visual Contact - If visual contact with the UAS is lost, the PIC shall command the aircraft into a hover mode and the observer shall try to re-establish visual contact. If visual contact cannot be re-established within a reasonable amount of time (determined by the PIC) then lost link procedures may be executed, unless the PIC has verified the telemetry data is believed to be accurate.
4. Loss of GPS Signal - Should the UAS lose GPS signal during operations, the PIC must immediately command the UAS into manual mode and land as soon as practical. If positive control of the UAS cannot be maintained and the UAS is leaving the operational area or the UAS poses a risk to life and/or property, the PIC will issue an engine kill command. In addition, a member from the flight team shall contact the closest ATC and advise them of the situation with the direction of the flight, altitude, battery remaining and speed.
5. Loss of UAS power (engine failure) - In the case

of failure or crash, the UAS team members will immediately attempt to locate the UAS, assess the scene for injuries, and render first aid as necessary. A crash report including proper notification must be completed as soon as possible. (Section N)

O. Mission Readiness

In order to ensure mission readiness, the following conditions shall be adhered to:

1. The UAS and related components shall be stored together in approved containers.
2. Batteries shall be cycled through a charger a minimum of once a month or as recommended by manufacturer. All batteries will be clearly labeled and replaced as needed.

P. Incidents and Accidents

1. During an incident/accident, efforts will be focused on: minimizing risk to life, Care for the injured, Protection of property.
2. Accident Notification and Investigation - The RPIC must report to the FAA within 10 days of any operation that results in serious injury, loss of consciousness, or property damage of at least \$500 (not including the unmanned aircraft). All in flight accidents and incidents involving fatalities, injuries, property damage, shall be reported to the Division Program Coordinator immediately for appropriate assistance with guidance.
3. Any damage to the UAS or its support system shall be reported *immediately* to a supervisor. Any damage to the UAS or equipment that renders the system inoperable shall be labeled out of service (OOS) so as to be observable. The UAS or its equipment will not be operated if un-airworthy.

Q. Maintenance

1. Minor issues (e.g. tightening loose screws, replacing antennas, changing pods, etc.) are allowed by trained department personnel. It may be necessary to return the aircraft to the manufacturer or authorized/licensed repair facility.

R. Training and Proficiency

1. Initial training will be accomplished through the fire & police department UAS training program. Or other certified training programs.
2. To remain proficient, pilots will log a minimum of 15 hours of day flight time and 3 hours of night flight time annually, show a working knowledge of maintenance of the aircraft, and complete a flight proficiency test annually. All flights will be documented in an approved log book.
3. Night flight is defined as: Flight of a UAS that occurs between the hours of one half hour after sunset and one half hour before sunrise. The time of sunset and sunrise are determined by the National Oceanic and Atmospheric Administration(NOAA), but 14 CFR Part 107 will allow small UAS operations to be conducted during civil twilight if the small unmanned aircraft has lighted anti-collision lighting visible for at least 3 statute miles. The night time- operations prohibition in this rule is waivable through the FAA for Part 107.

S. Privacy

UAS operations shall not infringe upon the rights and liberties of individuals.

1. Audio recording is not permitted without consent from parties involved.
2. Any recording obtained during flight operations other than training missions shall be considered Missouri City property and must be stored and maintained for at least 90 days. If the mission

becomes part of a call for service and is needed for evidence it shall be kept in the same time frame according to the statute of limitations. At that point, the video and or photos will be submitted in the same style as evidence is normally submitted to the Identification Division.

3. Flights of the UAS should not be flown below the highest object on a private person's property, unless to avoid an accident from taking place such as in the path of another aircraft.

T. General Responsibilities

It shall be the responsibility of all personnel to familiarize themselves and consistently apply the provisions of this policy. The following operating guidelines shall apply when operating an Unmanned Aircraft System (UAS) at an incident scene:

1. Upon arrival at an incident check in with the Incident Commander (I.C.) or their designate, such as the Staging Area Manager.
2. Once given an assignment determine the following prior to UAS Operations:
 - a. Is airspace restricted (i.e. within 5 miles of major airport, within a TFR, etc.) and make contact with Air Traffic Control if necessary or announce U.A.S. operations over regional aviation frequency as needed.
 - b. Is weather clear for safe U.A.S. operations?
 - c. Is the area free of manned aircraft/are you operating in coordination with manned aircraft?

- d. Is the area free of RF Occulting or Occluding Interference (i.e. large hills/buildings or cell/microwave towers etc.)
 - e. Is the area clear of overhead obstructions (i.e. tree canopy, powerlines, etc?)
 - f. Is there a clear/open takeoff and landing location (at least 4 foot in diameter and not excessively dusty/rocky or uneven).
 - g. Cone off Landing Zone for personnel safety.
3. Prior to take off complete the following Pre-Flight Check:
- a. Ensure camera is ready to record.
 - b. Aircraft, controller, and flight display are powered and connected.
 - c. Motors start with no abnormalities.
 - d. U.A.S. is connected to at least 6 GPS (if equipped for GPS flight).
 - e. No aircraft or controller warning indicators active.
 - f. Batteries are ready for flight (if capable of battery monitoring via flight controller).
 - g. Video is recording prior to take off.
4. Operations at Incidents should include the following:
- a. Structure Fires
 - i. Report into I.C. and determine how UAS will be utilized.

- ii. Complete Pre-Flight Checklist.
- iii. Take off and reach a safe altitude (perform a 360° Yaw to check that the aircraft is above any obstructions).
- iv. Work in communication with the I.C./Incident Safety Officer to provide constant scene size up and crew accountability.
- v. Place UAS in a hold and hover over structure on "D" Side unless otherwise directed by I.e./I.S.O.
- vi. Remain in one location to observe operations unless otherwise directed.
- vii. Utilize thermal imaging or electro-optical imagery as needed by I.C. /I.S.O.
- viii. Utilize spot light equipment during night operations if UAS capable and requested.
- ix. Report any unsafe actions/situations to I.C./I.S.O. as needed (i.e. roof failure, collapse potential, etc.)
- x. Utilize flight mapping/drawing tools, if capable, to mark hazards/incident features for I.e.

b. Wildland Fires

- i. Report into I.C. and determine how UAS will be utilized.
- ii. Complete Pre-Flight Checklist.
- iii. Take off and reach a safe altitude (perform a 360° Yaw to check that the aircraft is above any

obstructions).

- iv. Work in communication with the I.C./I.S.O. to provide constant scene size up and crew accountability.
- v. Locate the fire "Head" and determine.
 - 1. Direction of travel
 - 2. Rate of spread
- vi. Fuel types ahead of the fire.
- vii. Determine exposure hazards ahead of and adjacent to the fire.
- viii. Assist the I.e. with location of:
 - 1. Access to the fire via anchor points
 - 2. Safety Zones
 - 3. Escape Routes
 - 4. Terrain features that pose dangers to crews
- ix. Assist with personnel accountability and division assignments.
- x. Use caution while flying to avoid:
 - 1. Flying through smoke/fire
 - 2. Trees, buildings, powerlines, etc.
- xi. Maintain coordination with Air Branch, Air Attack, and Air Tankers aloft landing if necessary to give "right of way" to manned aircraft or powering off and crash landing the aircraft in emergency situations to avoid manned aircraft.
- xii. Fly alongside flanks, preferably upwind from the fire if at all possible.
- xiii. Utilize thermal imaging or electro-optical imagery as needed by I.e./I.S.O.
- xiv. Report any unsafe actions/situations to I.e./I.S.O. as needed (i.e. roof failure, collapse potential, etc.)
- xv. Work in communication with the IC/ISO to provide constant scene size up.

- xvi. Utilize spot light equipment during night operations if UAS capable and requested.
- xvii. Utilize flight mapping/drawing tools, if capable, to mark hazards/incident features for I.e

c. Hazardous Materials (HazMat)Operations

- i. Report into I.C. and determine how UAS will be utilized.
- ii. Complete Pre-Flight Checklist.
- iii. Take off and reach a safe altitude (perform a 360° Yaw to check that the aircraft is above any obstructions).
- iv. Work in communication with the I.C. /I.S.O. to provide constant scene size up and crew accountability.
- v. Place UAS in a hold and hover over structure upwind of the incident.
- vi. Remain in one location to observe operations unless otherwise directed.
- vii. Utilize thermal imaging or electro-optical imagery as needed by IC/ISO.
- viii. Utilize spot light equipment during night operations if UAS capable and requested.
- ix. Report any unsafe actions/situations to I.C./I.S.O. as needed (i.e. roof failure, collapse potential, etc.)
- x. Utilize flight mapping/drawing tools, if capable, to mark hazards/incident features for I.C.
- xi. Determine, if possible, the following:

1. Whether the incident is a spill, leak, contained to area etc.
2. Type of product released.
3. Amount of product released.
4. Hot/Warm/Cold Zones.
5. Evacuation/Shelter in place areas.
6. Plume/Runoff direction of travel.
7. Consider use of UAS Aerial Delivery System (ADS), if equipped, to deliver portable gas detector into areas for readings.

d. Disaster Damage Assessments

- i. Report into IC and determine how UAS will be utilized.
- ii. Determine area to be over flown.
- iii. Complete Pre-Flight Checklist.
- iv. Take off and reach a safe altitude (perform a 360° Yaw to check that the aircraft is above any obstructions).
- v. Fly designated route given by IC or his designate.
- vi. Record video throughout flight, change SD Card at battery changes so that imagery can be reviewed during subsequent flights.
- vii. Consider use of "live streaming" of imagery during flight.
- viii. Utilize flight mapping/drawing tools, if capable, to mark hazards/incident features for IC.
- ix. Fly in "grid" patterns maintaining straight lines and avoiding unnecessary course corrections (missed areas can be re-flown).
- x. Return to the most affected areas and re-fly at lower altitudes.

e. Search

- i. Report into IC and determine how UAS will be utilized.
- ii. Obtain Victim/Suspect descriptors.
- iii. Determine search area.
- iv. Utilize thermal imaging or electro-optical imagery as needed by IC/ISO.
- v. Complete Pre-Flight Checklist.
- vi. Take off and reach a safe altitude (perform a 360° Yaw to check that the aircraft is above any obstructions).
- vii. Utilize spot light equipment during night operations if UAS capable and requested.
- viii. Utilize flight mapping/drawing tools, if capable, to mark hazards/incident features for IC.
- ix. Fly designated route given by IC or his designate.
- x. Consider use of second operator, if capable, to operate the UAS camera.
- xi. Record video throughout flight, change SD Card at battery changes so that imagery can be reviewed during subsequent flights.
- xii. Consider use of "live streaming" of imagery during flight.
- xiii. Fly in "grid" patterns maintaining straight lines and avoiding unnecessary course corrections (missed areas can be re-flown).
- xiv. Escalate search after one (1) hour to increase area covered by the groundsearch to greater than 3 miles, if necessary.

xv. If a possible find is encountered:

1. Stop and hover.
2. Zoom in or obtain still imagery that can be zoomed into.
3. Mark the area via GPS and mapping for ground search units to investigate.
4. Coordinate the ingress of ground search units if needed.

f. Rescue

- i. Report into I.C. and determine how UAS will be utilized.
- ii. Complete Pre-Flight Checklist.
- iii. Ensure batteries are charged above 50%.
- iv. Load deliverable payload, if capable.
- v. Fly to victim and deliver payload.

g. Investigation

- i. Report into I.C. and determine how UAS will be utilized.
- ii. Obtain Victim/Suspect descriptors.
- iii. Determine investigation area and points of interest.
- iv. Utilize thermal imaging or electro-optical imagery as needed by Investigator.
- v. Complete Pre-Flight Checklist.
- vi. Take off and reach a safe altitude (perform a 360° Yaw to check that the aircraft is above any obstructions).
- vii. Utilize spot light equipment during night operations if UAS capable and requested.
- viii. Utilize flight mapping/drawing tools, if

capable, to mark incident features for investigator.

ix. Fly designated route given by investigator or his designee.

5. Upon completion of all UAS Operations the following Post Flight Check shall be performed:

- a. Ensure batteries are fully charged with no swelling of flight packs.
- b. Inspect propellers for cracks, chips, looseness (replace on or before manufacturer's recommendations).
- c. Inspect motors for free motion with no resistance.
- d. Inspect fuselage for stress cracks, loose screws or mounts, abnormal movement.
- e. Ensure all moving parts are not excessively loose or tight and that they are maintained per Manufacturers recommendations.