Public Safety Aviation Accreditation Commission

STANDARDS FOR SMALL UNMANNED AIRCRAFT SYSTEM (sUAS) PROGRAMS

SECTION 1 – ADMINISTRATIVE STANDARDS

01.01.00 General

01.01.01 Mission Statement

Standard: There shall be a written mission statement for the UAS Program.

Commentary: A mission statement sets broad parameters and identifies the key functions, or services to be performed by UAS Program. Care must be taken to ensure that the mission statement does not exceed current UAS program capabilities. Given that the UAS program is a support function for the agency, development of the mission statement must be a departmental process.

Compliance: Mandatory

01.01.02 Chain-of-Command

Standard: There shall be a well-defined chain-of-command:

1. There shall be an organizational chart that defines where the UAS Program fits within the agency. There shall also be a chart that defines the structure of the program.
2. UAS personnel shall demonstrate understanding of the chain-of-command.
3. For public safety agencies that contract for UAS services, there shall be a policy that specifies lines of authority between the agency and the contractor and that the agency is responsible for assuring that the contractor meets the PSAAC standards related to the service they provide.

Commentary: The chain-of-command in the UAS Program must be well defined and understood by each member. Unit members must know to whom they report and how they fit into the function of the agency. All agencies utilize organizational charts to depict this, and the agency's UAS function must be included into any organizational charts. For contract aviation services, there must be a written policy or contract that stipulates the lines of authority and responsibilities between both agreeing parties.

Compliance: Mandatory

01.01.03 UAS Program Budget

Standard: There shall be evidence of an approved budget or funding source for the operation of the program.

Commentary: Operational efficiency, safety and effectiveness are enhanced by the support of a comprehensive budget or funding source.

Compliance: Mandatory

01.01.04 Transparency

Standard: The agency shall have a policy that it will engage their governing body and community regarding acquisition of UAS and policies governing its use.

Commentary: For the public to accept and support the use of UAS, the agency must be transparent about the acquisition and uses of the equipment.

Compliance: Mandatory

01.01.05 Annual Report

Standard: The agency shall have a policy that mandates an annual report that summarizes all UAS operations. This report shall evaluate the effectiveness of the equipment and be made available to the public.

Commentary: An annual report allows the agency to evaluate the effectiveness of the program and by making the report available to the public keeps them informed of how the agency is utilizing the technology. The report could include such things as the number of UAS deployments, types and categories of missions and the number of each, review of privacy concerns and adequacy of policy to ensure privacy, assistance to other agencies, etc.

Compliance: Mandatory

01.01.06 Inquiries and Complaint Processing

Standard: There shall be a written policy that describes how inquiries and complaints about UAS operations are to be handled. This UAS specific policy shall supplement general agency policies regarding complaints/investigations. This policy, at a minimum, shall contain the following:

1. That any member of the agency, to include employees and/or contractors hired to provide UAS services, are required to immediately report suspected cases of misuse of UAS.
2. Any complaint alleging a violation of a person's civil rights by use of the UAS must result in a formal, documented investigation.

Commentary: Given the sensitivity of public safety UAS operations, the agency must assure that complaints concerning their use are fully investigated. In most agencies, there are different types of internal investigations for complaints, based on the nature of that complaint. UAS related investigations should be thorough and complete in order to assure accountability and community acceptance of the technology.

Compliance: Mandatory

01.01.07 Communications

Standard: Management policies should encourage ongoing communications between management and all UAS personnel. There should be periodic staff meetings for which minutes are kept on file, and there should be defined methods for disseminating information between meetings.

Commentary: Management policies should encourage ongoing communications between management and all UAS personnel. There should be periodic staff meetings for which minutes are kept on file, and there should be defined methods for disseminating information between meetings.

Compliance: Recommended

01.01.08 Liaison

Standard: The UAS Program shall have a written plan to maintain liaison with other aviation entities operating on a regular basis within the same airspace.

Commentary: Coordination between the UAS program and other aircraft (law enforcement, fire, EMS, SAR, news media), military and civilian operators that operate within the same airspace is important to ensure safe flight operations. Liaison should also be maintained with air traffic control facilities within the area of operations.

Compliance: Mandatory

01.01.09 Media Relations

Standard: The UAS Program shall have a media-relations policy.

Commentary: UAS operations are a high-profile operation. As such, they are frequently the subject of media inquiries. A media relation's policy that facilitates a good working relationship with the media can be beneficial to the agency.

Compliance: Mandatory

01.02.00 Operations Manual

01.02.01 UAS Operations Manual

Standard: The UAS Program shall have an operations manual that, at a minimum, contains the following sections:

1. Program Manager's Operational Philosophy
2. Mission Statement
3. Administrative
4. Personnel
5. Training
6. Operations
7. Safety Management System
8. UAS Maintenance and System Requirements
9. Special Operations (if applicable)
10. Appendix

All members shall be trained and demonstrate an understanding of the contents of the Operations Manual. This training shall be documented and all members shall receive a copy of the Operations Manual.

Commentary: A comprehensive manual supports safe, legal, ethical and cost-efficient operations. The manual clearly defines operational practices and sets parameters for decision-making.

Compliance: Mandatory

01.02.02 UAS Program Manager's Operational Philosophy

Standard: The manager shall adopt and publish an overall operational philosophy that identifies the program's mission and places the highest emphasis on safety, ethics and the rule of law in all aspects of the program's operation. The philosophy shall also establish goals to accomplish the mission and specifically reference risk management as a means of identifying, assessing and mitigating risks. The philosophy shall also clearly articulate that no mission is so critical that would necessitate acceptance of a high risk wherein hazards associated with or causing the higher risk cannot be mitigated or require deviation from safety policies, procedures, training standards or the prudent judgment of the aircrew. Further that no mission is so critical that unethical, or legally questionable tactics are permitted.

Commentary: It is imperative that the program manager establish and publish his/her overall operational philosophy emphasizing that safety, through a systematic program of risk management, standardization, training and leadership is the unit's first priority as a means to mission accomplishment. Further, in addition to safety, the program manager must establish ethics and compliance with the rule of law as a requirement for all UAS operations.

Compliance: Mandatory

01.02.03 Administrative

Standard: The Administrative Section of the manual shall include the following:

1. Statement that establishes the manual as a formal agency document.
2. Accountable Executive as the Issuing Authority
3. Scope of Authority
4. Resolution of conflicts between agency policy documents.
5. Procedures to amend the manual
6. Mandatory annual review, when new UAS technology is added, or any other significant changes occur.
7. UAS Program organization
8. Record keeping and retention (personnel, training and maintenance)
9. Distribution

Commentary: The manual must be an official agency document, to which UAS program members can be held accountable. The document must be reviewed and amended to reflect the changing circumstances of program operations and equipment and signed by the UAS Program Manager.

Compliance: Mandatory

01.02.04 Personnel

Standard: The Personnel Section of the manual shall establish standards for the following:

1. Qualifications and selection standards
2. Duties and responsibilities
3. Documentation of performance
4. Uniforms and safety equipment

Commentary: UAS personnel have specific qualifications, and the standards related to those qualifications must be identified in the manual. Other personnel issues such as duties and responsibilities, performance evaluations, uniforms/personal protective equipment, etc. shall be addressed in this section.

Compliance: Mandatory

01.02.05 Training

Standard: The Training Section shall outline the training mandates for UAS personnel, including:

1. Program manager and supervisors
2. Remote Pilots
3. Non-pilot crewmembers (visual observers and sensor operators)
4. Maintenance technicians

Commentary: Nothing in the traditional public safety career prepares personnel for an aviation assignment. The UAS program manager, supervisors, ~~air~~crew members, must be provided with training to give them the skills necessary to safely, effectively and efficiently function in this environment.

Compliance: Mandatory

01.02.06 Operations

Standard: The Operations Section of the manual shall address all operational aspects of the program. Examples of operational procedures requiring standards, where applicable are included in Appendix B of this document.

Commentary: The Operations Section of the manual sets parameters for decision-making by program personnel. This standard is intended to address all aspects of the program's operation

Compliance: Mandatory

01.02.07 Safety Management System

Standard: The Safety Management System Section of the Operations Manual shall be based on policies that establish safety as the first priority in program operations.

Commentary: The Safety Management System Section of the manual defines the SMS program, including each person's role and responsibility to manage risk and prevent mishaps.

Compliance: Mandatory

01.02.08 UAS Maintenance and System Requirements

Standard: The UAS System Requirements and Maintenance Section shall address the following:

1. General Maintenance Requirements
2. Personnel Authorized to Perform Maintenance
3. UAS Maintenance Records
4. Maintenance Requirements for Specialized Mission Equipment
5. Minimum System Requirements

Commentary: Unlike manned aircraft, there are a large number of manufacturers of small unmanned aircraft that produce systems for hobbyists and professionals alike. Further, at present there are no NAA standards for the design, manufacture, or maintenance of UAS. Thus, it is critical that public safety agencies obtain systems that are capable of performing the identified missions and that the system is maintained properly to assure airworthiness.

Compliance: Mandatory

01.02.09 Special Operations

Standard: The Special Operations Section shall establish standards for non-routine operations. Examples of Special Operations requiring standards, where applicable are included in Appendix C of this document.

Commentary: Special operations, defined as missions not conducted on a routine basis, must be identified and thoroughly evaluated to ensure that the operation does not exceed the capabilities of the UAS Program. Each special operations mission should be evaluated to determine if specific procedures, training and/or equipment are in place to accomplish the mission. Special operations missions shall not be authorized until all of these requirements have been met.

Compliance: Mandatory

01.02.10 Appendix

Standard: The Appendix to the manual should include, but not be limited to, the following:

1. Letters of Agreement
2. Glossary of terms
3. Training syllabi
4. Report forms
5. Miscellaneous items

Commentary: The Appendix contains any material necessary to support the information contained in the manual. Providing this material in a manner that is easily accessible provides quick reference for those who will rely on the manual for guidance on a routine basis.

Compliance: Recommended

01.02.11 Operations Manual Management of Change

Standard: A change management process shall be established in order to monitor changes in operational procedures, processes, training, documentation, equipment, or any other significant change impacting the UAS program. At a minimum, the process shall require:

1. Use a change management form/log, a copy of which shall be included with every copy of the operations manual to show that it is up to date.
2. Include all individuals affected by the change and ensure they have an opportunity to review the change and provide their comments.
3. Conduct appropriate risk assessments of the recommended changes.
4. Determine who is responsible for approving the change and put the change into effect.

Commentary: Change is inevitable, especially given the rapid advancement in UAS technology. Any one change can trigger changes in all of the elements of a program. For example, a new UAS system incorporating different technology and capabilities, will require additional training of crewmembers, but may also require changes to policy, maintenance, etc. Therefore, it is essential that a process be put into place to manage change to assure the policies and procedures governing every aspect of unit operations is up to date and program personnel are aware of the changes.

Compliance: Mandatory

SECTION 2 – OPERATIONAL STANDARDS

02.01.00 General

02.01.01 Aviation Regulatory Compliance

Standard: Public safety UAS programs shall comply with those regulations established by U.S. Federal Aviation Administration, Transport Canada or other national aviation authority (NAA). These regulations include:

1. For U.S. civil operations, 14 Code of Federal Regulations (CFR), PART 107.
2. For U.S. public aircraft operations, a Certificate of Authorization issued by the FAA.
3. Canadian Air Regulations (CARs), or other international civil/government aircraft operations.

Further, operations shall comply with any state, or local laws or regulations that apply to UAS.

Commentary: In the U.S., UAS missions can be conducted under civil or public regulations. The UAS program shall identify the classification of each mission and assure compliance with the appropriate regulations. Further, some states and local governments have enacted laws to restrict the use of UAS by public safety and the UAS program must comply.

Compliance: Mandatory

02.01.02 Authorized Uses of Unmanned Aircraft Systems

Standard: The agency shall have a policy that lists all authorized uses of the UAS. That policy must assure that UAS operations are legal, appropriate to support the agency mission and are an ethical use of this technology.

The following shall apply to all missions performed by the UAS Program:

1. Missions shall be specifically defined, documented and approved by the public safety agency.
2. Any deviation from the established list of authorized missions shall require supervisory approval and review by the UAS program manager.
3. Policy shall require that every use of the UAS will be carried out in a manner consistent with the requirements of the U.S. Constitution (or other national equivalent) and federal, state and local laws.

Crewmembers shall be trained and equipped in accordance with the standards as set forth in this document, for any and all missions they are authorized to perform.

Commentary: The agency must define the appropriate uses for UAS. All missions must be conducted in a manner that protects the rights of citizens and in compliance with all applicable laws. By carefully developing a list of specific authorized missions the agency can evaluate its needs and capabilities. The agency can also use this list of missions to assure the community it serves that UAS will be used for legitimate public safety missions. The list gives direction to UAS crews and provides for accountability for unauthorized missions. Once missions have been defined, all UAS personnel must be properly trained, equipped and have demonstrated their proficiency to perform those missions.

Compliance: Mandatory

02.01.03 Mission Authorization

Standard: The agency shall have a policy that requires supervisory approval for every UAS operation.

Commentary: Absent exigent circumstances, every UAS operation shall be subject to pre-mission review and authorization by a supervisor.

Compliance: Mandatory

02.02.00 UAS Crew Qualifications and Minimum Crew Requirements

02.02.01 Remote Pilot-in-Command Qualification

Standard: A remote pilot-in-command shall hold a FAA, or NAA equivalent remote pilot certificate, with a small unmanned aircraft systems class rating, be appropriately trained, qualified and current in the system being flown.

Commentary: While public aircraft operations in the U.S. allow for the agency to self-certify pilots, it is critical that the agency assure itself and its community that its pilots are certified to industry standards, the same as other UAS pilots. To do this, the agency must assure its pilots hold a FAA pilot certificate. Also, initial pilot certification must be followed by regular, realistic scenario based training in system operations.

Compliance: Mandatory

02.02.02 Other UAS Crew Qualifications

Standard: Other UAS crew includes supervisors, visual observers, sensor operators, etc. The agency should have a policy that specifies the minimum qualifications required to perform these functions.

Commentary: At present, there are no regulatory requirements for any position other than the RPIC. It is incumbent upon the agency to determine the minimum qualifications for those who will be trained to conduct UAS operations to assure safe, legal and ethical operations.

Compliance: Recommended

02.02.03 Minimum Crew Composition for UAS Operations

Standard: The minimum crew shall consist of a Remote Pilot-in-Command (RPIC) and at least one other crewmember performing the duties of a Visual Observer.

Commentary: The remote pilot alone cannot safely and effectively perform all the duties of RPIC and Visual Observer simultaneously. Therefore, a Visual Observer is considered essential during all operations. The supervisor and RPIC should confer during pre-flight planning to determine if additional crew are necessary for the mission**.**

Compliance: Mandatory

02.02.04 Crew Coordination and Communications

Standard: There shall be a policy that assures that regardless of the number of personnel used, all members of the flight crew (RPIC and the visual observer) must maintain effective communication with each other at all times. The procedure should also require the aviation equivalent of a “sterile cockpit”

during launch and recovery where non-essential communications are prohibited to avoid distracting the crew. Further, the distraction caused by personal electronic devices has proven to be a factor in many types of transportation accidents. Given this, use of PED's for non-mission related communications shall be prohibited during any phase of flight operations by any member of the UAS crew.

Commentary: With more than one crewmember, each with specific responsibilities, effective communications are essential, especially during the takeoff and recovery phase of flight. Distractions created by extraneous conversations, or PEDs must be controlled to assure safety of flight.

Compliance: Mandatory

02.02.05 Crew Rest Policy

Standard: The UAS program shall have a crew rest policy for all crewmembers relative to their individual flight duties. The crew rest policy shall at a minimum, address the following conditions:

1. A crew rest policy shall be established and managed in conjunction with a Fatigue Risk Management System (FRMS) under the SMS.
2. The FRMS shall determine the maximum number of flight hours for aircrews during a normal duty period within a 24-hour cycle based on mission factors, flight conditions and day/night operations.
3. A minimum of eight hours of rest between or within duty periods, or the equivalent level of rest according to the program's FRMS to minimize the likelihood of fatigue during flight operations is required.
4. A crewmember may terminate or decline a mission if, in the member's determination, they would be unsafe to perform the flight due to fatigue.

Commentary: Fatigue affects judgment, vision and physical coordination. Scheduling practices shall reflect consideration to minimize duty time, fatigue, type of mission, flight environment, length of duty period, number of duty periods per week, amount of flight time within a 24- hour period and day to night rotations.

Compliance: Mandatory

02.03.00 Operational Procedures

02.03.01 Pre-Flight Actions

Standard: The program shall have a policy dictating tasks to be completed prior to initiating flight activities. At a minimum, the policy shall include:

1. Determination of the classification of the airspace in which the flight will be conducted.
2. Completion of any required notifications to air traffic control.
3. Issuance of any required notice to airman (NOTAM).
4. A comprehensive flight risk assessment, to include, a standard weather briefing and a visual assessment of the flight operations area to identify hazards, such as man-made obstacles and terrain.
5. A thorough pre-flight inspection of the UAS, utilizing, at a minimum, the UAS manufacturers checklist.
6. A pre-mission briefing to all UAS crewmembers.

Commentary: Careful pre-flight planning, notifications and briefing of crewmembers will assist in ensuring the safety of operation and a successful mission outcome.

Compliance: Mandatory

02.03.02 Weather Minimums

Standard: Unmanned Aircraft System (UAS) weather minimums shall be established to ensure safe operations. These minimums shall be specified as a minimum distance from clouds and visibility in a written policy for both day and night operations. Crewmembers shall comply with their agency's or regulatory minima, whichever is more restrictive.

Commentary: It is important to recognize that visibility measurements should be taken from the remote pilot-in-command's location, rather than a distant weather reporting station.

Compliance: Mandatory

02.03.03 Minimum Standoff Distances and Maximum Altitudes

Standard: Minimum standoff distances from people and objects and maximum altitudes shall be established to ensure safe operations. These distances/altitudes shall be specified for both day and night operations. Maximum altitudes shall be based on applicable FAA/TC/NAA regulations.

Commentary: Taking into consideration the capabilities of the UAS being operated and the nature of the mission, the agency must establish minimum and maximum lateral distances and altitudes requirements to assure safe operations.

Compliance: Mandatory

02.03.04 Wind Limitations

Standard: Maximum wind limitations shall be established pursuant to the UAS manufacturer's recommendations.

Commentary: In addition to system recommendations, consideration should be given to establishing tiered maximum wind limitations based upon the individual remote pilot's level of experience.

Compliance: Mandatory

02.03.05 Night Vision Devices

Standard: Programs operating with Night Vision Devices (NVD) to enable UAS operations shall have a written policy governing their use. At a minimum, the policy shall include:

1. Initial training in the use of night vision devices for all crewmembers
2. NVD applications and limitations
3. NVD emergencies (device failures)
4. Physiological factors
5. Mission specific currency requirements for all crewmembers on at least an annual basis
6. Care, maintenance, inspection and security requirements of NVD's.

Commentary: The use of night vision devices requires specific policies concerning all facets of their use and crewmember training and qualifications. The use of NVDs may or may not be allowed by the NAA and it is important that the UAS program comply with all regulations relative to their use

Compliance: Mandatory

02.03.06 Over Water Operations

Standard: If missions are routinely flown over water the UAS should be equipped for a water recovery.

Commentary: Programs that operate over water should have the ability to safely recover the UAS in the event that it lands in the water. As such, UAS should float or should be equipped with external flotation equipment.

Compliance: Recommended

02.03.07 Aircraft Refueling, Defueling and Battery Recharging Procedures

Standard: There shall be a written policy regarding aircraft refueling, defueling and battery charging procedures. At a minimum, the policy shall include, but not be limited to:

1. Aircraft refueling and defueling shall be conducted in compliance with federal, state and local laws and specific procedures as outlined by the aircraft manufacturer.
2. Fuel storage, handling and dispensing on airports shall be in compliance with 14 CFR 139.321 (e) (1) and (2), CAR Part III or applicable national aviation authority, as applicable.
3. A documented, verifiable training program shall be in place to ensure that all personnel who are authorized to refuel aircraft have been trained to operate the fuel supply and firefighting systems in compliance with FAA AC 150/5230-4A, dated 9/28/2012 and applicable CARs or applicable national aviation authority.
4. Smoking prohibitions.
5. Batteries shall be recharged in accordance with the manufacturers recommendations. Lithium-Ion batteries shall not remain in a charger unattended, due to risk of fire.

Commentary: For aircraft powered by liquid fuel engines, refueling requires specific training and equipment. Policies should address refueling procedures for all UAS crewmembers authorized to refuel aircraft. The National Fire Protection Association (NFPA) has an excellent guide to fire safety during aircraft refueling. NFPA Pamphlet 407 could be a useful guide to units who refuel their own aircraft.

Lithium-Ion batteries have proven to be volatile when charged incorrectly. They shall be allowed to cool prior to charging; not left unattended when charging; and removed promptly from the battery charger when charging is complete

Compliance: Mandatory

02.03.08 Fuel and Battery Storage Procedures

Standard: There shall be a written policy regarding liquid fuel and battery storage, whichever is applicable for the type(s) of UAS being operated. At a minimum, the policy shall include, but not be limited to:

1. The on-site handling and disposal procedures of waste fuel, oil and any other hazardous material.
2. Fuel-spill procedures.
3. Mandate utilization of an approved storage container.
4. Fuel storage and handling shall be in accordance with applicable laws and regulations.
5. Smoking prohibitions.

Commentary: Proper fuel storage is essential to prevent fuel contamination and fire. Consideration should be given to the addition of fuel stabilizers to prevent the destabilization of fuel stored for long periods of time. To prevent environmental hazards, lithium-ion batteries must be disposed of in compliance with applicable laws and regulations.

Compliance: Mandatory

02.03.09 Fire Extinguishers

Standard: Fire extinguishers, appropriate for the types of hazards encountered, shall be readily available, consistent with laws and regulations. All personnel shall be properly trained (including recurrent training) on the proper use of the equipment

Commentary: Equipment and training in responding to a fire shall be considered mandatory in aircraft operating environments. This is particularly important for aircraft using liquid fuel engines. However, aircraft that are powered by lithium-ion batteries present threat of fire, thus crewmembers must be equipped and trained to respond to a fire emergency.

Compliance: Mandatory

02.03.10 Post Flight Actions

Standard: The program shall have a policy dictating the tasks to be completed upon the conclusion of flight activities. At a minimum, the policy shall include:

1. Completion of notifications of air traffic control that flight activities have ended.
2. Removal of NOTAM from the NOTAM system.
3. Downloading and transfer of any digital media evidence (video, photographs, etc.…) in accordance with the agency's digital media evidence policies.
4. A thorough post-flight inspection of the UAS, including the recording of any discrepancies.
5. A post-flight mission debriefing, to include emphasis on lessons learned.

Commentary: Thorough post-flight procedures will ensure that the UAS is prepared for subsequent flights, capitalize upon the ability to learn from the flight, and safeguard the evidence collected.

Compliance: Mandatory

02.04.00 Data Collection

02.04.01 Data Collection Minimization

Standard: The agency shall have a policy that states that the agency shall only collect information using UAS to the extent that such collection is consistent with and relevant to the authorized purpose.

Commentary: All UAS data collection activities will be performed in a manner consistent with the Constitution, applicable laws and regulations in order to protect the privacy rights of citizens

Compliance: Mandatory

02.04.02 Digital Media Evidence (DME)

Standard: The program shall have a policy that all DME shall be handled in accordance with existing policy on data and record retention, where applicable.

Commentary: DME presents unique challenges to public safety to assure the integrity of the data. UAS gathered data is just one of many sources of DME and the agency must have sound, legally compliant policies and procedures to manage that evidence.

Compliance: Mandatory

02.04.03 Disposition of Non-DME

Standard: The agency shall have a policy that requires all digitally recorded imagery (video, or still photography), or other data not required as evidence or for use in an on-going investigation shall be managed in accordance with agency policy. That policy shall include: mandate compliance with state or local records retention schedules; that agency personnel may not edit, alter, erase, duplicate, copy, share or otherwise distribute the data and whether the imagery is available for public inspection.

Commentary: Sensors carried aboard UAS capture large amounts of imagery that is not DME. The management and disposition of that imagery is important to the credibility and success of the UAS program.

Compliance: Mandatory

02.04.04 Personally Identifiable Information (PII)

Standard: The agency shall have a policy that states that any non-DME imagery that contains PII shall not be retained for more than 180 days, or in compliance with state or local record retention schedules.

Commentary: Retention of non-DME imagery that contains PII should only be retained if necessary. As with all non-DME imagery, management of this data is important to the credibility and success of the UAS program.

Compliance: Mandatory

02.05.00 Operational Reporting Requirements

02.05.01 Mission Reporting Requirements

Standard: The program shall have a policy that mandates reporting requirements for all UAS operations. At a minimum, the policy shall require:

1. That all flights are documented in an agency report or database.
2. The documentation shall include:
    a. Date
    b. Time
    c. Location of the flight
    d. Purpose of flight
    e. Supervisor approving flight
    f. Duration of flight
    g. Pre/Post Flight Time Meter/Calculator Readings
    h. Disposition of digital media evidence, or other data gathered during flight
    i. Crewmembers assigned
    j. Summary of activities
    k. Outcome of Deployment
    l. Supervisor approving the report

Commentary: As with most public safety operations, documentation is required to assure proper use, accountability, effectiveness of the processes and procedures used and technology itself.

Compliance: Mandatory

02.05.02 Monthly Audit Responsibilities

Standard: The program shall have a policy that mandates an audit of mission reports every calendar month. This audit shall be conducted by a program supervisor and shall assure that all missions and flight time are documented and approved. Audit reports shall be forwarded to the agency CEO or his/her designee. Inappropriate use or undocumented flight time will be investigated per agency policy.

Commentary: It is essential that all UAS flight operations be audited on a regular basis to assure accountability to evaluate effectiveness.

Compliance: Mandatory

02.05.03 After Action Reporting (AAR)

Standard: The program should have a policy that requires after action review of any significant incident where UAS were deployed. The policy will define a significant incident as an event that involves a violent encounter between agency members and others, use of force that causes death or serious injury, public demonstrations, crowd control events, etc.

Commentary: An after-action critique of a major incident is a routine public safety practice. By specifically evaluating the role of the UAS, the effectiveness and appropriateness of its use can be evaluated.

Compliance: Recommended

SECTION 3 – SAFETY STANDARDS

03.01.00 General Standards

03.01.01 Safety Management System (SMS)

Standard: The UAS safety program shall be based on the principles of a SMS and shall be incorporated into the Operations Manual. SMS is the formal, top-down, organization-wide approach to managing safety risk and assuring the effectiveness of safety risk controls. It includes systematic procedures, practices, and policies for the management of safety risk (FAA). The four components of a SMS program include: Safety Policy and Objectives; Safety Risk Management; Safety Assurance and Safety Promotion and Training.

Commentary: The principles of a SMS must be integrated into every facet of UAS operations. It defines the safety culture to include every member of the UAS program and their responsibility to operate in the safest manner possible in day-to-day operations. The ALEA SMS Tool Kit is a good source document for development of the unit's SMS Program.

Compliance: Mandatory

03.02.00 Safety Policy and Objectives

03.02.01 UAS Program Manager's Safety Policy

Standard: UAS program manager shall issue a policy that mandates safety as the program's highest priority. It shall articulate that management is committed to providing safe, healthy, secure working conditions and attitudes with the objective of having an accident free work environment. It shall

promote a "Just Culture" of open reporting all hazards in which management will not initiate disciplinary action against any personnel who, in good faith, discloses a hazard or safety occurrence due to unintentional conduct. The policy shall also embrace the following safety principles:

1. Always operate in the safest manner possible
2. Never take unnecessary risks
3. Recognize that safe does not mean risk free
4. Hold everyone accountable and responsible for the identification and management of risk

Commentary: The UAS program manager is the individual who defines the PROGRAM'S safety policy and conveys its expectations and objectives to all personnel. Safety must be integrated into all facets of UAS operations. The Safety Policy and the Operational Policy are the PROGRAM manager's way of establishing the importance of safety as it relates to the overall scope of operations.

Compliance: Mandatory

03.02.02 Emergency Response Plan (ERP)

Standard: The program shall have a written plan detailing the actions to be taken in the event of the following: death or serious injury to any person or any loss of consciousness; damage to any property, other than the small unmanned aircraft where the cost of repair (including materials and labor) exceeds $500, or in the event of total loss the fair market value of the property destroyed exceeds $500.

The plan shall include, but not limited to:

1. Individual actions that shall be taken in the event of an accident.
2. NAA reporting requirements of the remote pilot.
3. Initiate log of events and actions
4. Scene security and containment, identification of, collection and preservation of evidence, and first at scene checklist.
5. Current contact information for all UAS program personnel.
6. Immediate response checklist and notification procedures, including telephone numbers for:

    a. EMS/fire/rescue/law enforcement
    ~~b.~~ Command notification
    c. Forensics/Crime Lab
    d. FAA/TC/NAA Air Traffic Control facilities
    e. Medical care facilities
    f. Legal advisor/risk manager
    g. Medical Examiner/Coroner
    h. Crewmember family notification
    i. Aircraft manufacturer
    j. Other equipment manufacturers, if applicable
    k. Media

7. Request to be a party to the investigation and assign an agency representative to serve in that capacity.
8. Accident/incident investigation kit with responsibilities and procedures
9. Witness statement forms
10. Availability of services at key locations
11. Procedures for follow-up family care
12. Implementation of Critical Incident Stress Management for all personnel involved in the incident/accident
13. Damaged aircraft recovery procedures
14. All UAS personnel shall be trained in the implementation of the emergency response plan. There shall be a record of the training in the member's training records.

Commentary: An emergency response plan acknowledges the potential for incident or accident and defines the roles and responsibilities of members when responding to and investigating the occurrence. The plan identifies the process for preparing reports, determining the cause(s) of the accident and develops recommendations to prevent similar occurrences. The ERP should be distributed outside the unit, as necessary (communications center, command staff, other agencies, etc.) and exercised as required by SMS. In addition, the plan should be numbered and tracked for accountability and distribution purposes. This standard recognizes that given the nature of sUAS, the potential for a catastrophic event is minimal, but not impossible. Given this, the ERP will be applicable to and scalable to the nature of any unusual occurrence involving sUAS.

Compliance: Mandatory

03.03.00 Safety Risk Management

03.03.01 Hazard Identification & Analysis

Standard: The program shall establish procedures to collect data and investigate hazards, incidents, accidents, and instances of potential non-compliance with regulatory requirements, policies or procedures, , to identify root cause and recommend risk control measures.

Commentary: Every member of the UAS program must understand their role in identifying, reporting and mitigating hazards. The reporting system must process hazard reports in a timely manner in order to communicate hazard information to all concerned members.

Compliance: Mandatory

03.03.02 Safety Risk Assessment & Mitigation

Standard: The program shall develop and maintain a formal process that ensures analysis, assessment and control of the safety risks in operations. It shall also determine and analyze the risk factors related to the severity and likelihood of potential events associated with known hazards and identifies appropriate risk mitigation strategies. At a minimum, the risk assessment process shall:

1. Use a strategy that considers the severity and probability of a hazard.
2. Identify, assess and calculate an overall level of risk associated with the hazard.
3. Determine when to elevate the decision for risk acceptance to a higher level.
4. Analyze the risk and develop mitigation measures (such as using a Flight Risk Assessment Tool, or FRAT) to reduce the risk to *As Low as Reasonably Practical* (ALARP).
5. Develop a means to track corrective actions and their effectiveness

Commentary: By their very nature, public safety UAS operations involve some element of risk. In keeping with the Program Manager's operational and safety policy, the Safety Risk Assessment and Mitigation Program is an essential element of the primary safety goal which is the elimination of all accidents.

Compliance: Mandatory

03.04.00 Safety Assurance

03.04.01 SAFETY PERFORMANCE, MONITORING & Reporting

Standard: The UAS program manager shall monitor operational data to ensure the effectiveness of safety risk controls and assess system performance. An annual evaluation of the effectiveness of the safety program shall be conducted. If the agency contracts for services, they shall be monitored on a regular basis and inspected annually to ensure compliance with the standard.

Commentary: Regular evaluation of safety related issues including: training; operations: maintenance; equipment and communications supports the identification of hazard and risks. When mitigated, risk is reduced to the lowest possible level.

Compliance: Mandatory

03.05.00 Safety Promotion and Training

03.05.01 Training and Education

Standard: At a minimum the following safety associated training shall be conducted no-less-than semi-annually or as needed based on assignment of personnel:

1. **Risk Control Measures:** The UAS program manager shall develop a training component to instruct UAS aircrew on risk control measures (interventions) that are developed during the Risk Management Process. This will ensure crewmembers are familiar with those mitigations.
2. **SMS Indoctrination Training**: Safety Indoctrination Training shall be provided to all members of the UAS program and shall address the purpose of the SMS, individual responsibilities, and general hazards associated with UAS operations. Initial safety training shall be completed prior to assuming UAS duties. All training shall be documented.

Commentary: Safety training and education are essential for the SMS program to achieve its goals. SMS Indoctrination Training and Safety Orientation Training for new personnel are intended to familiarize new personnel with the purpose and process of SMS as well as hazards associated with unit operations

Compliance: Mandatory

03.05.02 Safety Information

Standard: The UAS program should provide safety related information, which shall be accessible to all personnel. Types of information that could be provided include, but not be limited to the following:

1. Safety bulleting
2. SMS library
3. Hazard information
4. Hazardous material lists
5. Regulatory updates
6. Technology updates

Commentary: There should be a system in place to ensure that members of the UAS program receive timely information on safety related issues. They can be maintained in physical form in a fixed location or electronically, accessible from remote locations.

Compliance: Recommended

SECTION 4 – UAS PROGRAM TRAINING STANDARDS

04.01.00 UAS Program Manager and Supervisors

04.01.01 UAS Program Manager and Supervisor(s) Initial Training

Standard: UAS program managers and supervisor(s), shall successfully complete a formal training program, to include:

1. Fundamentals of aviation.
2. Applicable Federal Aviation Regulations (FAR's), Canadian Air Regulations (CARs) or applicable national aviation authority (NAA) regulations.
3. Public Aircraft Operations
4. Safety Management Systems (SMS)
5. Community concerns regarding the use of UAS by government agencies.
6. Liability and Legal Issues

Commentary: UAS program managers must have training on topics specific to UAS operations. The training is necessary to acquaint program managers with issues that affect the safe, legal and ethical operation of the program.

Compliance: Mandatory

04.01.02 Completion of Training

Standard: The manager and supervisor's training shall be completed within one year after being assigned to the UAS program.

Commentary: Management/supervisory personnel assigned to any aviation operation must receive appropriate training as soon as possible after assignment.

Compliance: Mandatory

04.01.03 Continuing Education

Standard: Continuing professional development in aviation subjects should be provided and documented for program managers and supervisors. At a minimum, there should be annual specific training appropriate to the UAS Program's mission statement and scope of service.

Commentary: Continuing education is an important part of any profession. This is particularly true for mangers and supervisors of UAS programs given the evolving nature of the technology, legal and regulatory environment.

Compliance: Recommended

04.02.00 Remote Pilot in Command (RPIC)

04.02.01 RPIC Initial Training

Standard: In addition to the certification requirements of the Federal Aviation Regulations, Transport Canada, and/or the respective NAA, before a pilot may act as a RPIC, they shall receive training and demonstrate proficiency in the following areas:

1. Program policies and procedures.
2. Requirements of the program's FAA Certificate of Authorization, and/or Part 107 waiver(s) (if applicable).
3. Weather considerations specific to the unit's geographical area.
4. Orientation to airports, heliports, heli-spots or any approved landing zones in the local operating area.
5. Orientation to the controlled airspace in the local operating area.
6. Program flight risk assessment and hazard mitigation
7. Crew resource management policies
8. System specific fire safety and response
9. Pilots shall successfully complete a training program on safe and effective flight profiles while performing missions that are relevant to the unit's mission statement on the system(s) being operated by the UAS program.
10. In all cases, the following shall apply:
    a. The safe operation of the aircraft throughout all phases of flight shall be the primary concern of the pilot in command during all missions. All other mission requirements shall be secondary in priority.
    b. An in-house training program should be coordinated with an external training program, if available, to ensure, to the greatest possible extent, the most up-to-date training.

Commentary: In the course of their duties, the public safety RPIC will be exposed to missions that require specific training to be as safe and effective as possible. Many of the training anchors listed in this section are essentially part of a Crew Resource Management program unique to public safety aviation. Additionally, specialized equipment requires specialized training. Public Safety RPIC should receive internal and external training for the missions they perform.

Compliance: Mandatory

04.02.02 RPIC Recurrent Training

Standard: There shall be a program to evaluate the practical skills of pilots in the performance of unit missions. This evaluation shall be conducted annually and the results documented.

Further, there shall be objective performance standards relevant to the duties of the pilot, the unit's mission statement and scope of service. The following shall apply:

1. The safe operation of the aircraft throughout all phases of flight.
2. Pilots shall demonstrate proficiency by successfully completing a recurrent flight evaluation at least once each year administered by a designated evaluator within the UAS program.
3. The recurrent flight evaluation will include, but not limited to, the following:
    a. The proper and effective use of aircraft checklists
    b. Effective crew coordination
    c. Demonstrated proficiency of tasks associated with the missions performed by the unit for which they are qualified.
    d. Safe and effective mission planning, including launch/recovery location (for each type of system operated).
    e. Program policies and procedures.
    f. Legal and regulatory update.
    g. Demonstrated pilot proficiency in the operation of the aircraft in accordance with the applicable OEM manual.
4. Hazard identification & risk management which includes:
    a. Judgment and decision making
    b. Human factors
    c. Stress management in all phases of flight
    d. Interpersonal communications between crewmembers, to include prioritization and crew coordination.

e. Workload management
f. Ground Control Station distractions

5. Situational awareness
6. Emergency Procedures/Recurrent Training:
   a. Shall be conducted annually. ***However, it is strongly recommended that emergency procedures training be conducted at least twice annually.***
   b. Includes an oral exam on the aircraft limitations and emergency sections of the aircraft's flight manual.

Commentary: Recurrent evaluations are an effective method of ensuring that unit pilots are flying safely, performing missions in accordance with operating procedures and the UAS flight manual.

Compliance: Mandatory

04.03.00 Non-Pilot UAS Crewmembers

04.03.01 Sensor Operator (SO)

Standard: Before anyone may act as a sensor operator, they shall receive training and demonstrate proficiency in the following areas:

a. Aircraft and sensor preflight procedures
b. Aircraft launch and recovery procedures
c. Battery change or refueling procedures
d. Proper use of relevant aircraft/sensor checklists
e. Sterile cockpit procedures
f. Program policies and procedures
g. Digital Media Evidence (DME) chain of custody policy
h. Non-DME data handling procedures
i. Crew resource management (CRM)
j. Fire safety and response
k. Emergency procedures
l. Legal and regulatory issues

Commentary: Management shall assure that sensor operators are thoroughly trained and qualified to perform prior to assigning them to UAS duties.

Compliance: Mandatory

04.03.02 Visual Observer (VO)

Standard: Before anyone may act as a visual observer they shall be sufficiently briefed prior to flight with emphasis on:

1. Maintaining effective communication with the RPIC.
2. Clear definition of launch and recovery location.
3. Scanning airspace for potential collision hazards and maintain awareness of the position of the aircraft through direct visual observation.

Commentary: Visual observers may or may not be members of a permanent UAS crew, but may be selected by an RPIC to perform those duties during a specific mission. It is critical that the VO be briefed as to their role in the operation and an assessment made by the RPIC as to their capability to perform this role.

Compliance: Mandatory

04.06.00 Training Records

04.06.01 Training Records

Standard: Training records shall be maintained for all agency personnel with UAS responsibilities and document all required training. Records can be kept in written or electronic form. Records shall include the following information at a minimum:

1. Name, pilot certificate number and a listing of all ratings, if applicable;
2. Documentation showing the date of successful completion of initial and recurrent training for all personnel required to receive such training and shall include copies of certificates of training, or other proofs of compliance;
3. For pilot proficiency, the documentation or checklist used to record at a minimum the last three pilot proficiency check flights or examinations. For non-pilot crew, evaluations and certifications, where applicable;
4. Documentation related to any training failures or inability to successfully complete any required training, including check flights, and what remedial action was taken to satisfactorily complete the required training;
5. The make, model and type of aircraft or flight training equipment used to conduct the training.
6. The unit shall retain these records and copies of all pilot proficiency check flights, crewmember evaluations and certifications for a minimum of five years after the individual leaves the agency or longer if required by law or policy.

Commentary: Training records are essential to proper program management and protection against claims of negligence in personnel hiring, retention and training. In accordance with the FAA's Pilot Records Improvement Act (PRIA) of 1996, all pilot records should be maintained for at least five years past transfer or termination of employment.

Compliance: Mandatory

SECTION 5 – UAS MAINTENANCE AND MINIMUM SYSTEM REQUIREMENTS

05.01.00 General UAS Maintenance Requirements

05.01.01 Unmanned Aircraft System Maintenance Standards

Standard: UAS programs shall maintain their systems in compliance with requirements of the Federal Aviation Administration, Transport Canada or other national aviation authority (NAA) should they have those regulations and/or OEM maintenance requirements or recommendations. Absent maintenance regulations, or OEM requirements, the agency shall establish a maintenance program for the UAS being operated.

Commentary: Most national aviation authorities neither certify the design, or manufacture of sUAS, nor do they have regulations for on-going maintenance. Further, some manufacturers of sUAS do not have maintenance programs established for the systems they sell. The airworthiness of UAS must be assured and is dependent upon scheduled maintenance, thorough inspections and timely correction of discrepancies. It is incumbent on the agency operating sUAS to ensure their system(s) are airworthy at all times, even if they have to establish a maintenance program of their own design.

Compliance: Mandatory

05.01.02 Pre-Flight Inspections

Standard: For all UAS, there shall be a written policy that outlines the specific actions to be performed during pre-flight inspections to determine that the system is airworthy and ready for flight.

Commentary: The policy shall identify the specific pre-flight actions required to determine that the complete system is airworthy.

Compliance: Mandatory

05.01.03 Excess Military Unmanned Aircraft Systems

Standard: Programs operating excess military unmanned aircraft systems shall, at a minimum, maintain them in accordance with the appropriate military continued airworthiness program for the specific UAS.

Commentary: Military aircraft, including UAS, are designed and built to comply with strict airworthiness requirements in order to perform the military mission. Any UAS released from military service must be maintained in accordance with the military maintenance program in order to assure safe operations.

Compliance: Mandatory

05.01.04 Airworthiness Directives (AD) and/or Military Safety of Flight Bulletins

Standard: There shall be a system in place to ensure that the program is in compliance with all applicable FAA/TC/NAA ADs and Military Safety of Flight Bulletins. Additionally, compliance with Service Bulletins or Military Advisory Bulletins should be accomplished in a timely manner.
Commentary: Airworthiness Directives and/or Military Safety of Flight Bulletins require mandatory compliance on or before their due date. Service Bulletins and Military Advisory Bulletins are issued when a potentially hazardous condition may exist and compliance is strongly recommended. Since they are not issued on a scheduled basis, it is very important that a tracking mechanism exist to ensure compliance

Compliance: Mandatory

05.01.05 Operational Flight Check

Standard: An operational flight check or return to service test flight shall be performed by a Remote Pilot in Command designated by the program manager to validate the maintenance that was performed and ensure that the results of the test flight are documented in the appropriate maintenance records.

Commentary: Operational flight checks, when required, are intended to ensure that maintenance performed has been properly completed and the aircraft is ready to be returned to service.

Compliance: Mandatory

05.01.06 Prohibiting Alterations

Standard: There shall be a policy that prohibits anyone from altering, or modifying the UAS in any manner, without authorization from the program manager.

Commentary: Any modifications or alterations to complex technology could affect its ability to operate safely and effectively. Such actions must be done in accordance with regulatory, OEM or agency standards and performed by authorized personnel.

Compliance: Mandatory

05.01.07 Prohibiting Arming Unmanned Aircraft Systems

Standard: The program shall establish a written policy specifically prohibiting attaching or deploying weapons of any kind from the UAS.

Commentary: The ability to accurately deploy weapons from many small UAS is questionable. Further, the concept of weaponized public safety UAS has not yet been accepted by the community.

Compliance: Mandatory

05.02.00 Personnel Authorized to Perform System Maintenance

05.02.01 Personnel Authorized to Perform Maintenance

Standard: The UAS program shall have a policy that determines who is authorized to perform maintenance on agency UAS.

Commentary: Even the most basic UAS involve complex technology. It is essential that the UAS program identify who is authorized to perform maintenance on any system component.

Compliance: Mandatory

05.02.02 Maintenance Technician Qualifications

Standard: Maintenance technicians shall meet the following minimum requirements:

1. Maintenance technicians/engineers shall be trained to install, maintain, upgrade, remove and replace any system part, software, firmware, etc. in accordance with the manufacturer's maintenance standards. **Compliance: Mandatory**
2. Maintenance technicians/engineers should be factory trained (or equivalent) in an approved program on each type of UAS they are required to maintain. **Compliance: Recommended**

Commentary: Operational safety requires a highly proficient and properly trained maintenance staff. These qualifications will instill confidence in the aircrews and enhance professionalism throughout the UAS Program**.**

Compliance: As noted in the standard.

05.02.03 Pilot Authorized Maintenance

Standard: In accordance with applicable regulations, there shall be a written policy that outlines what maintenance, if any, pilots may perform. Pilots may receive instruction from a maintenance technician/engineer on authorized maintenance procedures and a record kept of this training.

Commentary: Utilizing manufacturer's guidelines and/or recommendations, agencies will create a written policy listing pilot authorized maintenance items for each UAS make and model. All maintenance performed, including software and firmware updates, will be documented in a maintenance log assigned to that specific UAS.

Compliance: Mandatory

05.02.04 Outsourced Maintenance

Standard: If the program outsources UAS maintenance, they shall have a written policy assuring that the maintenance contractor, at a minimum, complies with all applicable maintenance standards in this section. Additionally, the program shall appoint a member with knowledge of the maintenance contract requirements, to be responsible for oversight of the maintenance contractor. For the purpose of accreditation, the program shall provide documentation verifying that the maintenance contractor is in compliance with the Standards as outlined in this section.

Commentary: It is recommended that the agency include compliance with the Standards in this section as part of the terms and conditions of the maintenance contract. Assigning a UAS program member to have oversight of this maintenance provider is one way of assuring compliance.

Compliance: Mandatory

05.03.00 Unmanned Aircraft System Maintenance Records

05.03.01 Unmanned Aircraft System Maintenance Records

STANDARD: There shall be a written policy that assigns responsibility for maintaining aircraft maintenance records. Logbook entries shall be made in accordance with the FAA/TC/NAA Regulations, military maintenance standards, if applicable, OEM instructions, or agency policy.

COMMENTARY: The airworthiness of the vast majority of UAS are not certified by the national civil aviation authority. Documenting maintenance is essential to assuring airworthiness. When documenting maintenance, logbook entries will, at a minimum, include the date the maintenance was performed, a description of the maintenance performed, and the signature of the person performing and making the logbook entry.

Compliance: Mandatory

05.03.02 Maintenance Discrepancy Reporting

Standard: There shall be a written policy that outlines procedures for written reporting of UAS discrepancies, taking UAS out of service, tracking repairs and providing feedback to reporting persons. The policy must also mandate that discrepancy reporting comply with FAA/TC/NAA Regulations, military maintenance standards, if applicable, OEM instructions, or agency policy.

Commentary: Often a pilot verbally reports a discrepancy to a maintenance technician and it gets overlooked. The discrepancy, along with any corrective action taken, must be recorded in the aircraft's maintenance records. A status board available to all pilots is an additional method of providing system status information.

Compliance: Mandatory

05.03.03 Deferred Maintenance

Standard: There shall be a procedure to track and complete all deferred maintenance.

Commentary: When any maintenance has been deferred, it is critical to have a procedure in place to track and ensure completion of the deferred maintenance in a timely manner

Compliance: Mandatory

05.04.00 Maintenance Requirements for Specialized Mission Equipment

05.04.01 Specialized Mission Equipment Maintenance

Standard: The program shall have a policy that ensures that all special mission equipment is inspected and maintained in accordance with FAA/TC/NAA regulations, military maintenance standards, if applicable, OEM instructions, or agency policy.

The following are examples of special mission equipment:

1. Laser Range Finders
2. UAS Payloads
3. Night Vision Devices
4. Communication Equipment (Radios)

Commentary: Inspection and maintenance of specialized equipment are critical to safe and effective operations and requires a record keeping process that ensures compliance with OEM and regulatory requirements.

Compliance: Mandatory

05.05.00 System Requirements

05.05.01 General System Requirements

Standard: The agency should evaluate the capabilities of both the UAS and its manufacturer during the program development/purchase process. Such evaluation should validate the ability of the system to accomplish the identified missions of the UAS program and shall include the following:

1) Ability of the manufacturer to support the UAS.
2) Minimum system requirements
3) Performance testing
4) Data link security

Commentary: Acquiring a UAS that is capable of performing the identified mission is critical to the success of the program. Further, the ability of the manufacturer to support the system throughout its intended life cycle is a valid performance measure for the purchase of any technology/equipment.

Compliance: Recommended

05.05.02 Evaluation of the System Manufacturer

Standard: As part of the evaluation process, the agency should evaluate the manufacturer's history and ability to support the UAS. The manufacturer of the UAS should be able to provide the following, at a minimum:

1. Operations and maintenance manuals/information
2. Operator and maintenance training
3. Parts lists
4. Sensors necessary to complete the identified mission
5. Ability to upgrade system software and firmware

Commentary: With a multitude of companies offering UAS for sale, with vastly different levels of experience, it is incumbent on the agency to assure the wise expenditure of public funds by making good purchase decisions. This includes evaluating the manufacturer of the system to verify their ability to design and manufacture airworthy, mission capable systems and to provide essential support for the system over its anticipated useful life. The United States National Institute of Justice, in their December 2016 document, "*Considerations and Recommendations for Implementing an Unmanned Aircraft System (UAS) Program,"* includes many factors to consider during the acquisition process and recommends the manufacturer have at least five (5) years' experience delivering UAS.

Compliance: Recommended

05.05.03 Recommended System Requirements

Standard: The program should have a policy that the Unmanned Aircraft System meets the following minimum requirements:

1. Standardized, operational checklists for all aspects of pre-flight/flight/post-flight.
2. Ability to verify the connectivity/control link between the ground control station (GCS) and the Unmanned Air Vehicle (UAV).
3. Ability to monitor the battery or fuel level of the UAV at the GCS.
4. Ability to monitor the altitude of the UAV at the GCS.
5. A tamper-proof flight time recorder.
6. Flight telemetry, including date, time, altitude, GPS coordinates, etc.
7. Ability of the UAV to autonomously execute a specific protocol in the event of loss of the command and control link with the GCS.
8. Ability to conduct flight operations in the weather conditions routinely encountered in the agency's area of operations.
9. Video streaming
10. For sunset to sunrise operations, a position/anti-collision lighting system (standard aviation lighting configuration) visible for no less than 3 statute miles.

Commentary: These minimum specifications are essential to perform the public safety mission, safely and to provide for accountability.

Compliance: Recommended

O5.05.04 Performance Testing

Standard: The agency should consider performance testing to assure the system(s) being considered for acquisition has the capabilities to complete the tasks required to perform the identified mission.

Commentary: The system should be tested to determine if it can perform public safety missions. The National Institute of Standards and Technology (NIST) has recommended tests and performance standards for UAS and is a good resource for this standard.

Compliance: Recommended

05.05.05 Network Security Requirements

Standard: The agency should define the data link security requirements for the UAS that meets the needs of their identified mission and the environment in which they will operate.

Commentary: All UAS use wireless communication links between the UAV, telemetry box (base station) and/or a control tablet. Those links can be compromised either intentionally, or accidently by other devices using the same frequencies if those data links are not protected with a suitable level of encryption. Further, sensitive video/senor data being downlinked from the aircraft could be intercepted. Encryption protocols vary greatly by manufacturer and range from those with little, or no encryption for systems using open source autopilots to the Advanced Encryption Standard (AES) established by the U.S. National Institute of Standards and Technology (NIST). Programs should consider requiring AES 256-bit encryption, the highest level of encryption, for sensitive public safety operations.

Compliance: Recommended