DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AERONAUTICAL SYSTEMS CENTER (AFMC)
WRIGHT-PATTERSON AIR FORCE BASE OHIO

MEMORANDUM FOR HQ USAFA/DFCS
2354 Fairchild Dr., Suite 2F52
USAF Academy, CO 80840-6240

11 FEB 2010

FROM: ASC/EN
2530 Loop Road West
Wright-Patterson AFB OH 45433-7101

SUBJECT: Air Force Policy Directive (AFPD) 62-6 Waiver Request for ScanEagle Small Tactical Unmanned Aerial Systems (STUAS)

References (a) AFPD 62-6 Waiver Request for ScanEagle Small Tactical Unmanned Aerial System (STUAS), HQ USAFA/DFCS to ASC/EN
(b) AFPD 62-6, USAF Aircraft Airworthiness Certification, 1 Oct 00
(c) Airworthiness Certification Circular No. 6, Special Operational Airworthiness Release (SOAR) Process, 24 Aug 07

1. The letter identified in Reference (a) requested a waiver from the airworthiness certification requirements of reference (b) and requested permission to utilize the reference (c) SOAR process for these small unmanned aircraft systems (UAS).

2. The ASC/EN SOAR review team conducted a review of the information provided with your request, along with additional facts subsequently provided by your contractor. The review team presented its' findings to the Airworthiness Board on 11 Feb 2010, with recommendations to approve AFPD 62-6 Waiver Request and to issue a SOAR.

3. For the purpose of this SOAR, an Information Assurance risk analysis needs to be performed according to DoDI 8500.2 and AFI 33-210. The identified risks from the analysis must be accepted by the appropriate authorities prior to initiation of flight operations of the ScanEagle at USAFA. Any future changes of the systems security posture will require a formal Platform IT Interim Authority To Operate (IATO) approval which will also address the existing risk issues.

4. My points of contact for this action are (b) [redacted] (b) [redacted] (b) (6) [redacted]

(b) (6) [redacted]

Attachments:
ScanEagle SOAR #2009-035

Special Operational Airworthiness Release (SOAR)
for the
ScanEagle Small Tactical Unmanned Aerial System (STUAS)

SOAR Number: 2009-035
Date Issued: 11 February 2010
Expiration Date: 10 February 2011
Applicability: United States Air Force Academy (USAFA) Department of Electrical and Computer Engineering
USAF Airworthiness POC: (b) [redacted]
Program/Project POC: (b) (6) [redacted]

References:

a. AFPD 62-6 Waiver Request for ScanEagle Small Tactical Unmanned Aerial System (STUAS), memorandum from HQ USAFA/DFCS to ASC/EN,
b. AFPD 62-6, USAF Aircraft Airworthiness Certification, 01 October 2000
c. Airworthiness Certification Circular No. 6, Special Operational Airworthiness Release (SOAR) Process, 24 August 2007
d. SOAR Review for ScanEagle STUAS Briefing
e. Defense Contract Management Agency Instruction 8210.1 Contractor's Flight and Ground Operations, 1 March 2007
f. USAF Small Unmanned Aircraft System CONOPS Annexes A, B, and C, 1 October 2007

1. Scope: Reference (a) requested assistance in obtaining a waiver from the airworthiness certification requirements of reference (b) and requested permission to utilize the reference (c) SOAR process for the ScanEagle Small Tactical Unmanned Aerial System (STUAS). This SOAR constitutes a safety of flight operational release for the ScanEagle STUAS for flight operations within active restricted airspace and over unpopulated or sparsely populated area in the State of Colorado. These flight operations will be conducted and/or supervised by contractors or USAFA faculty/staff qualified in accordance with the requirements contained in references (e) and (f) respectively. This SOAR is limited to the flight operations defined above only and is valid thru the expiration date identified in this letter. Compliance with the requirements contained in Reference (a) and to the Configuration, Limitations, Restrictions, Warnings, Cautions, and Notes; and Other Remarks identified by this SOAR in the paragraphs below is **MANDATORY**; any non-compliance will result in immediate revocation of this SOAR.

2. Configuration Reviewed: In accordance with Reference (a) and as follows:

a. Manufacturer: The Insitu Group

b. Model: Insitu ScanEagle – Block D

c. Dimensions: Wingspan – 10.2 feet; Length – 3.9 feet; Body Diameter – 7 inches

d. Empty Weight: 28.7 pounds

f. Maximum Gross Take-Off Weight: 44.1 pounds

e. Payloads: EO or IR turret - Hood Tech Alticam 600 (proprietary payload)

g. Power Plant: 3W, 28.5 cc, Two-Stroke, Pusher-Propeller

h. Avionics: Block D

i. Datalink:
C2 900 MHz Uplink and Downlink using a spread spectrum frequency-hopping transceiver system (1 watt emitted power in a public band).
Video Downlink – 2.2 to 2.5 GHz using two distinct analog transmitters on two different frequencies

j. Ground Control Station (GCS): Two stationary GCS to be used for Launch and Recovery. Two Transportable GCS to be used for cadet use.

k. Recovery System: MK I Mod II Skyhook

l. Launcher: Insitu SuperWedge Launcher, Mark III, Mod II

3. Limitations: The most restrictive limits in accordance with Reference (a), and as follows apply:

a. Gross Weight: MGTOW 45 pounds

b. Flight Altitude: Maximum 3000 ft above ground level (AGL) or lower if restricted by airspace limitations

c. Range: Continuous Line of Sight (LOS) distances only

d. Wind Speed: Less than 35 knots (18 m/s) during launch; Less than 40 knots (21 m/s) for retrieval

e. Cross Winds: Less than 10 knots (5 m/s) during launch; Less than 20 knots (10 m/s) for retrieval.

f. Rain: Avoid flying in extended heavy rain conditions, as defined in the Operator's Handbook.

g. Launch Method: Catapult only

h. Landing Method: Autonomous Skyhook or autonomous failsafe mode

i. Flight Control: Manual and autonomous flights authorized

j. Minimum crew composition per UAS : pilot/operator & observer(s). Minimum of one observer per radius mile per UAS.

k. Maximum of one crew per aircraft and one aircraft per crew

l. Each control station is limited to controlling a maximum of one aircraft

m. Maximum of two aircraft in flight at one time

n. Identify and maintain a safe separation between two airborne UAS. Safe separation distances must be documented for use in preflight planning.

o. The minimum dimensions of the launch and recovery hazards zones shall be in accordance with Figures 1 and 2 of the "ScanEagle UAS Safety Assessment and Analysis", Dec 2009, respectively.

4. Restrictions:

a. Flight operations under this SOAR shall be accomplished by operators trained and qualified in the operation of the ScanEagle STUAS. Operator training and qualification shall be documented. Limited operation by student operators is permitted provided trained instructor/operator is present and monitoring student inputs at all times.

b. Flight is restricted to day Visual Meteorological Conditions within the areas defined in Reference (a) and the approved Federal Aviation Administration (FAA) Certificate of Authorization (COA). Visual Flight Rules (VFR) weather conditions (3 statute miles visibility; cloud clearance 500 feet below; 1000 feet above; 2000 feet horizontal) only and not in possible icing conditions. The air vehicle must remain within visual range of the operator and/or ground observers at all times.

c. Flight outside of the areas of Reference (a) is not authorized under this SOAR.

d. Full functional checks of the air vehicle and associated payload shall be accomplished before each flight. Launch of the air vehicle with any known system failures, discrepancies, or degraded performance characteristics is prohibited. This includes but is not limited to the air vehicle, payload, Ground Control Station (GCS), launcher, retrieval system, antennas, weather monitoring systems, ground-based radar, and other required support equipment.

e. Fail-safes shall be in place to minimize risk of uncontrolled departure of aircraft from the approved flight zones (such as automatic throttle kill, etc).

f. Upon the occurrence of any system failures resulting in departure of the air vehicle from the flight areas defined in Reference (a), flight operations under this SOAR are to be terminated.

g. Upon any failure during flight, vehicle operators must fly the aircraft back to the recovery location or utilize built in fail-safe features to recover the air vehicle. Temporary loss of GPS satellites is not considered a failure condition.

h. All payloads and payload configurations shall be tested and evaluated for compatibility with the aircraft and ground stations to ensure safe operation and control of the air vehicle. This shall include weight, balance, mechanical, electrical, and radiating emissions, as a minimum. All test results, analyses, and safety assessments shall be documented, reviewed, and configuration managed as part of the aircraft and test configuration.

i. Major modifications (as defined in paragraph 6b) during flight testing invalidates the SOAR.

j. Maintenance and Supply done by only certified contractor maintenance representatives.

k. All site deconfliction activities (air and ground) shall be completed before flight (such as but not limited to frequency/channel usage, airspace management, air vehicle separation, FAA coordination, emergency response responsibilities, etc).

l. Frequency clearance is required prior to flight operations in the form of either a Special Temporary Authorization or an approved DD Form 1494.

5. **Special Warnings, Cautions, and Notes:** In conjunction with the Cautions, Warnings, and Notes found in the operating manuals and procedures, the following Special Warnings, Cautions, and Notes are applicable. Failure to comply with the following could result in loss of vehicle control and possible loss of or damage to the air vehicle and/or personal injury.

--------- WARNING ---------

Access to the landing hazard area by non-participants must be restricted. The operator should receive indication from personnel within the landing hazard area that they are prepared for commencement of recovery operations. Personnel within the landing hazard area should be prepared to move quickly if the air vehicle deviates from the intended landing path.

--------- WARNING ---------

The airborne and ground system has not undergone complete Electromagnetic Interference/Electromagnetic Compatibility (EMI/EMC) testing. Operations should be conducted away from antennas of active radio transmitters and radars, especially those operating at high power levels. Air vehicle control or navigation could be disrupted when either the air vehicle or GCS is subjected to radio frequency (RF) energy. Minimum safe separation distances from sources of RF energy have not been established due to lack of test data. This susceptibility to disruption could also impair co-located operations of multiple UAS.

--------- WARNING ---------

Compliance with airspace coordination and de-confliction requirements identified by the approved MOA, FAA COA and KAFF ATC supporting these flight operations is **MANDATORY**. This SOAR does not address interoperability with manned aircraft. The ScanEagle STUAS does not have collision avoidance equipment installed and mid-air collision with other aircraft is a risk. All flight operations shall be conducted to ensure that manned and unmanned aircraft shall not occupy the same airspace.

--------- CAUTION ---------

Caution must be utilized when operating in the vicinity of the Aardvark airstrip due to its close proximity to the roads and populated areas east of the launch and recovery area.

--------- CAUTION ---------

In order to maintain terrain clearance, operators should be aware of the altitude of the terrain and obstacles in the operating area.

--------- CAUTION ---------

Flight outside of line-of-sight area or behind objects and terrain features will increase the risk of collision, personal injury, and loss of the air vehicle. At a minimum the result will be loss of link. Operators should avoid unintentional flight into a loss-of-link status.

6. **Other Remarks:**

a. This SOAR **does not** provide Air Force airworthiness certification as defined in Air Force Policy Directive 62-6, USAF Aircraft Airworthiness Certification.

b. This SOAR process review was limited to the specific system configuration listed in Paragraph 2 above. Engineering assessment has been conducted primarily to ensure safety of flight in the immediate environment of all personnel involved in the flight operations referenced herein. Major air vehicle or system modifications invalidate this SOAR. For the purposes of this SOAR, a major modification is defined as any configuration change/alteration to an item(s) that implements a capability change and/or expanded mission/usage or would result in a hazard associated with departure of the air vehicle from the flight boundaries defined in Reference (a).

c. Any incident which affects the validity of this SOAR, experienced during flight operations conducted under this SOAR, must be reported to HQ USAFA/DFEC, ASC/EN, 306 FTG/SE, USAFA Safety Office, and HQ AFSOC Safety within twenty-four (24) hours of occurrence.

d. Range and airspace clearance is the responsibility of the operators. Compliance with airspace coordination and de-confliction requirements identified by the FAA COA supporting these flight operations is **MANDATORY**.

e. Procedures to establish a reasonable level of physical security for the flight operations areas prior to and during all flights must be developed and implemented during each flight to preclude inadvertent access to the test area by non-test personnel.

f. Determination of the requirements for operator qualification, maintainer qualification, configuration management, established flight test practices, and other associated procedures is beyond the scope of this SOAR, but must be addressed by an appropriate authority to ensure an acceptable level of safety for the UAS and to minimize the risk to ground personnel and property.

g. Flight logs shall be maintained and made available to assist in the effort to address future airworthiness assessments/renewals. This data shall include, but is not limited to, dates of flights, number of flights, flight durations, and discrepancies noted during flights and how discrepancies were resolved.

h. This SOAR is issued under the authority of SAF/AQ Memorandum, 14 Aug 07, Request for Delegation of Waiver Authority, and ASC/(b) Memorandum, 25 Sep 07, Delegation of Waiver Authority for AFPD 62-6.

(b) (6)

[redacted]

Acting Director, Engineering