

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

CERTIFICATE OF WAIVER OR AUTHORIZATION

ISSUED TO

Department of the Navy

(b) (3) (A)

47123 Buse Road, Building 2272
Patuxent River, MD 20670-1547

(b) (6)

This certificate is issued for the operations specifically described hereinafter. No person shall conduct any operation pursuant to the authority of this certificate except in accordance with the standard and special provisions contained in this certificate, and such other requirements of the Federal Aviation Regulations not specifically waived by this certificate.

Operation of the USN Global Hawk UAS within:

- Class A airspace directly to/from (b) (3) FL500.
- Over-water Class A and oceanic airspace delegated to FAA control from FL510 to FL600 with the following boundaries: the U.S. coastline (west) to the outer Contiguous U.S. ADIZ (east), to the Canadian ADIZ (north), to W-465, inclusive, (south). Any flights outside of the eastern boundary will require prior approval by the affected FAA facility(s).
- Overland Class A airspace across the panhandle of Florida between (b) (3)
- Over-water Class A and oceanic airspace delegated to FAA control from FL510 to FL600 in the Gulf of Mexico. Any flights outside FAA control (south) will require prior approval by the affected FAA facility(s).
- A signed Letter of Agreement (LOA) between (b) (3) and affected air traffic control facilities must be in effect prior to operations approved under this COA. The LOA may be more restrictive based on ATC requirements, but cannot be less restrictive than the contents of this Certificate.
- Flight profiles in other areas will require additional COAs.

LIST OF WAIVED REGULATIONS BY SECTION AND TITLE

N/A

STANDARD PROVISIONS

1. A copy of the application made for this certificate shall be attached and become a part hereof.
2. This certificate shall be presented for inspection upon the request of any authorized representative of the Federal Aviation Administration, or of any State or municipal official charged with the duty of enforcing local laws or regulations.
3. The holder of this certificate shall be responsible for the strict observance of the terms and provisions contained herein.
4. This certificate is nontransferable.

Note-This certificate constitutes a waiver of those Federal rules or regulations specifically referred to above. It does not constitute a waiver of any State law or local ordinance.

SPECIAL PROVISIONS

Special Provisions are set forth and attached.

This certificate 2011-ESA-51 is effective from October 2, 2011 to October 1, 2012, and is subject to cancellation at any time upon notice by the Administrator or his/her authorized representative.

BY DIRECTION OF THE ADMINISTRATOR



FAA Headquarters, AJV-13
(Region)

For: Dean E. Fulmer
(Signature)

September 29, 2011
(Date)

Acting Manager, Unmanned Aircraft Systems
(Title)

ATTACHMENT to FAA FORM 7711-1

Issued To: Department of the Navy
Program Executive Officer
Strike Weapons and Unmanned Aviation
47123 Buse Road, Building 2272
Patuxent River, MD 20670-1547
(b) (6)

Name: Certificate of Authorization (COA) for the USN Global Hawk Unmanned Aircraft System (UAS)

Activity: Operation of the USN Global Hawk UAS within:

- Class A airspace directly to/from Warning Areas (b) (3) at or above FL500.
- Over-water Class A and oceanic airspace delegated to FAA control from FL510 to FL600 with the following boundaries: the U.S. coastline (west) to the outer Contiguous U.S. ADIZ (east), to the Canadian ADIZ (north), to (b) (3), inclusive, (south). Any flights outside of the eastern boundary will require prior approval by the affected FAA facility(s).
- Overland Class A airspace across the panhandle of Florida between (b) (3)
- Over-water Class A and oceanic airspace delegated to FAA control from FL510 to FL600 in the Gulf of Mexico. Any flights outside FAA control (south) will require prior approval by the affected FAA facility(s).
- A signed Letter of Agreement (LOA) between (b) (3)

and affected air traffic control facilities must be in effect prior to operations approved under this COA. The LOA may be more restrictive based on ATC requirements, but cannot be less restrictive than the contents of this Certificate.

- Flight profiles in other areas will require additional COAs.

Purpose: To prescribe UAS operating requirements in the NAS (outside of restricted and/or warning area airspace) for the purpose of training and/or operational flights.

Dates Of Use: This COA (2011-ESA-51) is valid from October 2, 2011, through October 1, 2012. Should a renewal become necessary, the proponent shall advise the FAA, in writing, no later than 60 days prior to the requested effective date.

General Provisions:

- The review of this activity is based on our current understanding of UAS operations, and the impact of such operations in the NAS, and therefore should not be considered a precedent for future operations. As changes occur in the UAS industry, or in our understanding of it, there may be changes to the limitations and conditions for similar operations.
- All personnel connected with the UAS operation must comply with the contents of this authorization and its special provisions.

- This COA will be reviewed and amended as necessary to conform to changing UAS policy and guidance.

Safety Provisions:

Unmanned aircraft (UA) have no on-board pilot to perform see-and-avoid responsibilities and, therefore, when operating outside of active restricted/warning/Class A airspace areas, special provisions must be made to ensure an equivalent level of safety exists for operations had a pilot been on board. In accordance with 14 CFR Part 91, *General Operating and Flight Rules*, Subpart J-Waivers, 91.903, *Policy and Procedures*, the following provisions provide acceptable mitigation of 14 CFR Part 91.111/113 and must be complied with:

- For the purpose of see-and-avoid, visual observers must be utilized at all times except in Class A airspace, restricted areas, and warning areas. The observers may either be ground based or in a chase plane. If the chase aircraft is operating more than 100 feet above/below and/or ½ nm laterally, of the UA, the chase aircraft PIC will advise the controlling ATC facility. Visual Observers, either ground-based or airborne, must be used below Class A airspace.
- In order to comply with the see and avoid requirements of Title 14 of the Code of Federal Regulations sections 91.113 and 91.111, the pilot-in-command and visual observers must be able to see the aircraft and the surrounding airspace throughout the entire flight; and be able to determine the aircraft's altitude, flight path and proximity to traffic and other hazards (terrain, weather, structures) sufficiently to exercise effective control of the aircraft to give right-of-way to other aircraft, and to prevent the aircraft from creating a collision hazard.
- UAS pilots will ensure there is a safe operating distance between manned and unmanned aircraft at all times in accordance with 14 CFR Part 91.111, *Operating Near Other Aircraft*, and 14 CFR Part 91.113, *Right-of-Way Rules*. Additionally, UAS operations are advised to operate well clear of all known manned aircraft operations.
- The applicant and/or its representatives are responsible for collision avoidance with all aircraft, other aviation operations, and the safety of persons or property on the surface.
- Note: The holder of this COA, or delegated representative, is responsible for halting or canceling activity in the approved flight area if, at any time, the safety of persons or property on the ground or in the air is in jeopardy, or if there is a failure to comply with the terms or conditions of this waiver. It is the responsibility of the United States Navy to provide for the safety of flight in the National Airspace System and provide for the safety of persons and property on the ground. The FAA has the authority to cancel this COA or delay any activities if the safety of persons or property on the ground or in the air is in jeopardy, or if there is a violation of the terms specified.

Airworthiness Certification Provisions:

- UA must be shown to be airworthy to conduct flight operations in the NAS.
- Public Use Aircraft applications must contain one of the following:
 - A civil airworthiness certification from the FAA, or

- A statement specifying that the Department of Defense Handbook “Airworthiness Certification Criteria” (MIL-HDBK-516), as amended, was used to certify the aircraft or
- Equivalent method of certification.
- Note: The Department of the Navy has made its own determination on the airworthiness and safety of the Global Hawk UAS. The Global Hawk must be operated in strict compliance with all provisions and conditions contained in the Airworthiness Release, including all appendices.

Pilot / Observer Provisions:

- **Pilot Qualifications:** UA pilots interacting with Air Traffic Control (ATC) shall have sufficient expertise to perform that task readily. Pilots must have an understanding of and comply with Federal Aviation Regulations and Military Regulations applicable to the airspace where the UAS will operate. Pilots must have in their possession a current second class (or higher) airman medical certificate that has been issued under 14 CFR Part 67, *Medical Standards and Certification*, or a military equivalent. 14 CFR Part 91.17, *Alcohol or Drugs*, applies to UA pilots.
- Aircraft and Operations Requirements:
 - Flight Below 18,000 Feet Mean Sea Level (MSL).
 - UA operations below 18,000 feet MSL in any airspace generally accessible to aircraft flying in accordance with visual flight rules (VFR) require visual observers, either airborne or ground-based. Use of ATC radar alone does not constitute sufficient collision risk mitigation in airspace where uncooperative airborne operations may be conducted.
 - Flights At or Above 18,000 Feet Mean Sea Level (MSL)
 - When operating on an instrument ATC clearance, the UA pilot-in-command must ensure the following:
 - An ATC clearance has been filed, obtained and followed.
 - Positional information shall be provided in reference to established NAS fixes, NAVAIDS, and waypoints. Use of Latitude/Longitude is not authorized unless specifically approved by ATC.
- **Observer Qualifications:** Observers must have been provided with sufficient training to communicate clearly to the pilot any turning instructions required to stay clear of conflicting traffic. Observers will receive training on rules and responsibilities described in 14 CFR Part 91.111, *Operating Near Other Aircraft*, 14 CFR Part 91.113, *Right-of-Way Rules*, cloud clearance, in-flight visibility, and the pilot controller glossary including standard ATC phraseology and communication. Observers must have in their possession a current second class (or higher) airman medical certificate that has been issued under 14 CFR Part 67, *Medical Standards and Certification*, or a military equivalent. 14 CFR Part 91.17, *Alcohol or Drugs*, applies to UA observers.
- **Pilot-in-Command (PIC) –**
 - **Visual Flight Rules (VFR) as applicable:**
 - The PIC is the person directly responsible for the operation of the UA. The responsibility and authority of the pilot in command as described by 14 CFR Part 91.3 (or military equivalent), applies to the UAS PIC.

- The PIC operating a UA in line of sight must pass at a minimum the required knowledge test for a commercial pilot certificate, or military equivalent, as stated in 14 CFR Part 61.105, and must keep their aeronautical knowledge up to date.
- There is no intent to suggest that there is any requirement for the UAS PIC to be qualified as a crewmember of a manned aircraft.
- Pilots flying a UA on other than instrument flight plans beyond line of sight of the PIC must possess a minimum of a current commercial pilot certificate, or military equivalent in the category and class, as stated in 14 CFR Part 61.105.
- **Instrument Flight Rules (IFR) as applicable:**
 - The PIC is the person directly responsible for the operation of the UA. The responsibility and authority of the pilot in command as described by 14 CFR Part 91.3 (or military equivalent), applies to the UAS PIC.
 - The PIC must be a certified pilot (minimum of commercial pilot) of manned aircraft (FAA or military equivalent) in category and class of aircraft flown.
 - The PIC must also have a current/appropriate instrument rating (manned aircraft, FAA or military equivalent) for the category and class of aircraft flown.
- **Pilot Proficiency – VFR/IFR as applicable:**
 - Pilots will not act as a VFR/IFR PIC unless they have had three qualified proficiency events within the preceding 90 days.
 - The term “qualified proficiency event” is a UAS-specific term necessary due to the diversity of UAS types and control systems.
 - A qualified proficiency event is an event requiring the pilot to exercise the training and skills unique to the UAS in which proficiency is maintained.
 - Pilots will not act as an IFR PIC unless they have had six instrument qualifying events in the preceding six calendar months (an event that requires the PIC to exercise instrument flight skills unique to the UAS).
- **PIC Responsibilities:**
 - Pilots are responsible for a thorough preflight inspection of the UAS. Flight operations will not be undertaken unless the UAS is airworthy. The airworthiness provisions of 14 CFR Part 91.7, *Civil Aircraft Airworthiness*, or the military equivalent, apply.
 - The PIC must conduct a pre-takeoff briefing which includes, but is not limited to, the contents of the COA, the maximum altitude to be flown, initial heading, frequencies, lost link procedures, parameters for the use of a ditch point, hazards unique to the flight being flown, emergency landing procedures on takeoff and landing, and the amount of fuel including a reserve on the UA.
 - One PIC must be designated at all times and is responsible for the safety of the UA and persons and property along the UA flight path.
 - The PIC of an aircraft is directly responsible for, and is the final authority of, the operation of that aircraft. The UAS pilot will be held accountable for controlling their aircraft to the same standards as the pilot of a manned aircraft. The provisions of 14 CFR Part 91.13, *Careless and Reckless Operation*, apply to UAS pilots.
- **Pilot/Observer Task Limitations:**

- Pilots and observers must not perform crew duties for more than one UA at a time.
- Chase aircraft pilots must not concurrently perform either observer or UA pilot duties along with chase pilot duties.
- Pilots are not allowed to perform concurrent duties both as pilot and observer.
- Observers are not allowed to perform concurrent duties both as pilot and observer.
- Any visual observer, sensor operator, or other person charged with providing collision avoidance for the UA must have immediate communication with the pilot-in-command (PIC). If a chase aircraft is being utilized, immediate communication between the chase aircraft and the PIC is required at all times.

Standard Provisions: These provisions are applicable to all operations unless indicated otherwise in the Special Provisions section.

- When required, the UA PIC will maintain direct two-way communications with ATC and have the ability to maneuver the UA per their instructions. The PIC shall comply with all ATC instructions and/or clearances.
- If equipped, the UA shall operate with an operational mode 3/A transponder, with altitude encoding, or mode S transponder (preferred) set to an ATC assigned squawk. IFR certified equipment, including the transponder and encoding altimeter and the associated pitot static system, is required for all flights into Class A airspace or when flying under an Instrument Flight Plan.
- If equipped, the UA shall operate with position/navigation and anti-collision (strobe) lights on at all times during flight.
- The UA PIC shall not accept any ATC clearance requiring the use of visual separation, sequencing, or a visual approach.
- VFR cloud clearances and visibilities for Class E airspace will be used regardless of class of airspace the UAS is operating in, except when operating in Class A airspace where 14 CFR Part 91.155 will apply.
- Special VFR is not authorized.
- Operations within Reduced Vertical Separation Minimum Airspace (RVSM) are prohibited.
- Operations (including lost link procedures) shall not be conducted over populated areas, heavily trafficked roads, or an open-air assembly of people.
- Operations outside of restricted areas, warning areas, prohibited areas (designated for aviation use) and/or Class A airspace may only be conducted during daylight hours.
- Operations shall not loiter on Victor airways, Jet Routes, Q Routes, T Routes, IR Routes, or VR Routes. When necessary, transit of airways and routes shall be conducted as expeditiously as possible.
- Operations conducted under VFR rules shall operate at appropriate VFR altitudes for direction of flight (14 CFR Part 91.159).
- The UA PIC or chase plane PIC (whichever is applicable) will notify ATC of any in flight emergency or aircraft accident as soon as practical.
- All operators that use GPS as a sole source must check all NOTAMs and Receiver Autonomous Integrity Monitoring (RAIM). Flight into GPS test area or degraded RAIM is prohibited without specific approval.
- At no time will TCAS be used in any mode while operating an unmanned aircraft.

- A copy of the COA including the special limitations must be at the site whenever UA operations are being conducted. The PIC, the visual observer, and all associated personnel with any UA flights must read the COA including the special provisions, and must adhere to the contents and special provisions contained in the COA.
- Sterile cockpit procedures must be observed during critical phases of flight.
- The United States Navy and/or its representatives, is responsible at all times for collision avoidance with non-participating aircraft and the safety of persons or property on the surface with respect to the UAS.

Special Provisions:

1. All operations outside of warning areas, restricted areas, and Class A airspace must be conducted in visual meteorological conditions (VMC), under Instrument Flight Rules (IFR), with weather minimums of 3,000 feet and five miles.
2. Launch and recovery of the UA must only be accomplished at (b) (3) while the airport traffic control tower (ATCT) is operating, Class D airspace is active, and any associated restricted/warning area airspace is active. Upon exiting Class D airspace, all continued climb transition to Class A airspace must be accomplished wholly within restricted/warning area airspace. For arrivals, descent must be accomplished wholly within restricted/warning area airspace until entering Class D airspace.
3. Night operations are authorized provided the (b) (3) ATCT is operating, Class D airspace is active, and the associated restricted airspace is active.
4. Pre-coordination with air traffic control (ATC) must be accomplished prior to flight and ATC radar monitoring must be available throughout the portion of the flight in Class A airspace where available.
5. For all operations, an IFR flight plan must be filed, and a pilot in command (PIC) must be designated.
6. All RQ-4 Global Hawk operations must be controlled by one PIC for one RQ-4A Global Hawk aircraft. The use of multi-vehicle control is prohibited.
7. Prior to flight a frequency integrity check must be accomplished to ensure there are no adverse impacts to command and control of the UA.
8. The PIC must have immediate radio communication with appropriate ATC facilities and all voice communications between the pilot and ATC must be established through onboard radio equipment to provide a voice relay.
9. It is the responsibility of the United States Navy to ensure the RQ-4A Global Hawk is capable of complying with all ATC clearances and instructions.
10. The use of cell phones or other telephonic communication is restricted to the operational control of the UA and any required communication/coordination with ATC. Cell phones or other telephonic communication shall not be used as the primary communication with ATC in lieu of direct two-way radio contact.
11. All operations shall be conducted in accordance with the provisions contained in signed Letter(s) of Agreement (LOA). The LOA(s) must include specific responsibilities and/or procedures to ensure a smooth operation. Examples include, but are not limited to, the following:

- Flight planning, airspace scheduling and activation, and pre-launch notification procedures.
 - The coordination process/procedures between the proponent and (1) the appropriate ARTCC military operations specialists (or designated representative), (2) U.S. Navy Fleet Area Control & Surveillance Facilities, and (3) Using Agencies of Special Use Airspace and Air Traffic Control Assigned Airspace (ATCAAs).
 - Departure and arrival routes and other procedures to gain access to the over-water operating areas. The approved routes are at Attachment 1.
 - All known flight profile descriptions with accompanying route of flight charts. The charts depicting the (b) (3) Routes are at Attachments 2, 3, and 4, respectively.
 - The “local flying area” includes the PXT restricted areas, the departure and arrival routes (Atch 1), and (b) (3)
 - Any special provisions based on air traffic control requirements.
12. Air Traffic Control Assigned Airspace (ATCAAs) will be established and defined in the LOA and will be in accordance with, and a subset to, the airspace described in the paragraph “Activity” above. The ATCAAs are depicted in Attachment 5. The ATCAAs will be in ZDC, ZNY, and ZBW airspace. GH missions in ZJX, ZMA, and ZHU airspace will use flight plan routing. The communications plan for the ATCAAs will also be delineated in the LOA.
- The ATCAAs will be used for GH missions using the “Northern Route.”
 - Flights on the “Southern Route” will use a combination of ATCAA airspace and flight-planned routing. Flight plan routing will be used once the GH reaches ZJX airspace. The ATCAAs end on the demarcation line between ZDC and ZJX.
13. The “Gulf of Mexico Route” will be an extension of the “Southern Route.” The GH will have the option to fly overland across Florida between the Atlantic Ocean and the Gulf of Mexico. (b) (3) will be used as a ditching point in case of a catastrophic failure. Additionally, the GH will have the option of flying over water, around Florida, to gain access to the Gulf of Mexico.
14. The proponent shall ensure all flight operations, excluding departure and arrival maneuvers, are conducted at or above FL510, unless previously coordinated. Under normal conditions, the Global Hawk will use (b) (3) to reach FL500 before transitioning to the warning areas. However, if weather conditions dictate (i.e., high-wind conditions at altitude), Washington ARTCC may, traffic permitting, approve transitions at lower altitudes, but no lower than FL300. This also applies to transitions from the warning areas to (b) (3)
15. UAS Emergencies/contingency modes:
- Global Hawk has three primary contingency modes: C-1 Lost data link/communications, C-2 Return to base, and C-3 Emergency landing.
 - During a C-1 contingency (squawk (b) (3) or a C-2 return to base contingency (squawking normal), Global Hawk will return to (b) (3) The ATC facility having communications and control with Global Hawk will initiate the proper coordination immediately upon receiving notification of any C-1/2 category system malfunction.
16. If a C-3 contingency mode exists, Global Hawk will squawk (b) (3) and make an emergency landing.

- (b) (3) (see Attachment 1). If Global Hawk is operating west of the (b) (3) the aircraft will return to (b) (3) for landing. If Global Hawk is over or east of the (b) (3), Global Hawk shall proceed to (b) (3) for landing.
- (b) (3) If Global Hawk is operating at or west of the (b) (3) (b) (3) (see Attachment 1), the aircraft will return to (b) (3) for landing maintaining FL 500 to the maximum extent possible, going no lower than FL 410 before (b) (3). If Global Hawk is east of (b) (3), Global Hawk shall proceed to (b) (3) for landing.

17. In addition to (b) (3) the United States Navy (USN) has made contingency plans and has identified emergency/divert airfields in the event RQ-4A Global Hawk experiences C1, C2, and/or C3 events. The intent of these points is to ensure airborne operations are predictable. The USN must coordinate these plans with ATC.

18. Lost link procedures are contained in the Letter of Agreement.

NOTAM: A distance (D) Notice to Airman shall be issued when UA operations are being conducted. This requirement may be accomplished through your local base operations or NOTAM issuing authority. You may also complete this requirement by contacting Flight Service Station at 1-877-4-US-NTMS (1-877-487-6867) not more than 72 hours in advance, but not less than 48 hours prior to the operation and provide:

- Name and Address of pilot filing NOTAM request
- Location, Altitude or the operating Area
- Time and nature of the activity

NOTE FOR PROPONENTS FILING THEIR NOTAM WITH DoD ONLY: This requirement to file with the AFSS is in addition to any local procedures/requirements for filing through DINS. The FAA Unmanned Aircraft Systems Office is working with the AFSS, and to eliminate the requirement to file a NOTAM with both the AFSS and DINS in the near future.

Data reporting provisions: The following information is required to document operations associated with UAS activities. The reported information is required for all operations covered under a COA regardless of the type of airspace flown to include activities within Special Use Airspace (SUA). The proponent for the COA shall submit the following information via COA On-Line on a monthly basis using the On-Line forms:

- Number of flights conducted under this COA. (A flight during which any portion is conducted in the NAS shall be counted only once, regardless of how many times it may enter and leave special use airspace between takeoff and landing.)
- Aircraft operational hours per flight
- GCS operational hours in support of each flight, to include LRE Ops
- Pilot duty time per flight
- Equipment malfunctions (hardware/software) affecting either the aircraft or the ground control station.
- Deviations from ATC instructions and/or Letters of Agreement/Procedures
- Operational/coordination issues

- Number and duration of lost link events (control, vehicle performance and health monitoring, or communications) per aircraft per flight

INCIDENT / ACCIDENT REPORTING: The following information is required to document unusual occurrences associated with Unmanned Aircraft Systems activities in the National Air Space System.

- The proponent for the COA shall provide the following information to Donald.E.Grampp@faa.gov as soon as possible and no later than 7 days from the conclusion of the mission or expiration of this COA:
 - Number of flights conducted under this COA.
 - Pilot duty time per flight.
 - Unusual equipment malfunctions (hardware/software).
 - Deviations from ATC instructions.
 - Operational/coordination issues.
 - All periods of Loss of Communications.
- The following shall be submitted to Donald.E.Grampp@faa.gov within 24 hours:
 - Deviations from the “Special Provisions” contained in the COA.
 - All periods of Loss Link, including duration.
 - All incidents involving the UAS as defined in 49 CFR 830.
 - All accidents involving the UAS as defined in 49 CFR 830.

This COA does not, in itself, waive any Federal Aviation Regulation (FAR) nor any state law or local ordinance. Should the proposed operation conflict with any state law or local ordinance, or require permission of local authorities or property owners, it is the responsibility of the USN to resolve the matter. This COA does not authorize flight within Special Use Airspace without approval from the Using Agency. The USN is hereby authorized to operate UAS in the Operations Area described in the “Activity” section of this attachment, subject to the appropriate Letter of Agreement.

Attachment 1: (b) (3)	(2 Charts)
Attachment 2: (b) (3)	(2 Charts)
Attachment 3: (b) (3)	(2 Charts)
Attachment 4: (b) (3)	(2 Charts)
Attachment 5: (b) (3)	(2 Charts)

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