The Part 107 Waiver Process and Airspace Authorizations

Lead: Brad Zeigler
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Workshop 5: The Part 107 Waiver Process and Airspace Authorizations

- **Lead: Brad Zeigler**, Aviation Safety Analyst, Airman Training and Certification Branch, FAA Flight Standards Service
- **Scott Gardner**, Acting Manager, FAA Emerging Technologies Integration Directorate, FAA Mission Support Services
- **Diana Cooper**, Vice President of Legal & Policy Affairs, PrecisionHawk

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What is a waiver and why do I need one?

• A waiver provides flexibility to existing regulations

• §107.200(a)

  The Administrator may issue a certificate of waiver authorizing a deviation from any regulation specified in §107.205 if the Administrator finds that a proposed small UAS operation can safely be conducted under the terms of that certificate of waiver.

• Allows a UAS operator to propose an operation that is not permitted under part 107

  – It is the applicant’s responsibility to propose means by which the operation may be safely conducted.

• Intended to accommodate new technologies and unique operational circumstances.

• Less burdensome than an exemption

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What can be waived?

Sections of part 107 that may be waived can be found in § 107.205 and are listed below:

• § 107.25 Operation from a moving vehicle or aircraft.
• § 107.29 Daylight operation.
• § 107.31 Visual line of sight aircraft operation.
• § 107.33 Visual observer.
• § 107.35 Operation of multiple small unmanned aircraft systems.
• § 107.37(a) Yielding the right of way.
• § 107.39 Operation over people.
• § 107.41 Authorization to conduct operation in certain airspace.
• § 107.51 Operating limitations for small unmanned aircraft.
Process Overview

Apply via FAA Public Website
Performance Based Standards

Received by AFS-800
Application System Entry Reference # to Applicant Assigned to Waiver Team

Waiver Analysis
Applicant, ATO Coordination Team Recommendation

Management Review
Concur/Non Concur

Issuance of Results
Send Approval, Disapproval or RFI to applicant Post Results to Public Website

Time for review/analysis ≤ 90 days*
Time depends on request/complexity

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Waivers to Part 107

- The FAA has issued almost 400 non-airspace Part 107 waivers
- Most of the waivers have been for nighttime operations
- Criteria is available on the UAS website in the Performance-Based Standards document, along with detailed instructions for submitting waiver requests.

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## Waiver Challenges and Solutions

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<td>• Applications involving Operations over People, Beyond Visual Line of</td>
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<td>Sight (BVLOS), and Operations above 400 AGL</td>
<td>• Close coordination with Operations Over People and Expanded Ops</td>
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<td>• Volume/tracking of applications</td>
<td>• Increased resources</td>
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<td>• Streamlined processes</td>
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<td>• IT improvements (Enterprise Gateway)</td>
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<td>• Waivers valid for 48 calendar months</td>
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How can I improve my chances of having my waiver approved?

• Do your homework
  – Read the instructions
  – Search for approved waivers
• Only ask for what you need
• Fully describe your operation, your proposed mitigations and how they meet the performance based standards for safe operation
• Don’t dump documents in your application
• Respond promptly to requests for more information
• We will consider any waiver application, but challenging waivers such as Over People or BVLOS will require significant effort and resources on the part of the applicant

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Why were these waivers not approved?

Waiver/Airspace Authorization

- Regulations subject to waiver:
  - 107.25: Operations from a moving vehicle or aircraft
  - 107.29: Daylight operation
  - 107.31: Visual line of sight aircraft operation
  - 107.33: Visual observer
  - 107.35: Operation of multiple sUAS
  - 107.39: Operation over people
  - 107.41: Operation in certain airspace
  - 107.51(a): Operating limitations: ground speed
  - 107.51(b): Operating limitations: altitude
  - 107.51(c): Operating limitations: minimum visibility
  - 107.51(d): Operating limitations: minimum distance from clouds

- Regulations subject to airspace authorization:
  - 107.41: Operation in certain airspace

- Proposed area of operations: Our area of operations will be primarily in the city limits of [Redacted] and secondarily in the [Redacted]. If requested by outside public service agencies we would operate in the jurisdiction of that agency if allowed by this waiver.

- Proposed maximum flight altitude (above ground level): 500

- Class of airspace: C

- Description of proposed operation: We have obtained two Phantom 4 UAS and plan to augment them in our present “Air Support Unit” division. They would be deployed as requested to assist in missions that enhance public safety for public events / gatherings. They also may be used for officer safety purposes for barricaded subjects, high risk warrants, building searches, and to photograph major wreck scenes, etc... We currently fly a Robinson R-44 Helicopter in the Air Support Unit and are very familiar with airspace restrictions and safety considerations. All remote pilots would be required to obtain remote pilot licenses (UAS). *** The GPS coordinates were mandatory on this application and are the coordinates of our air support hangar. The area of operation would be city wide and as described above. All class C airspace operations would be coordinated with the [Redacted] ATC tower.
Why were these waivers not approved?

Waiver/Airspace Authorization

- Regulations subject to waiver:
  - 107.29: Daylight operation
  - 107.39: Operation over people
  - 107.41: Operation in certain airspace
  - 107.51(b): Operating limitations: altitude

- Regulations subject to airspace authorization:
  - 107.41: Operation in certain airspace

- Proposed area of operations: This is the Fall Classic race run for I am the hired cameraman for the event Plaza

- Proposed maximum flight altitude (above ground level): 250AGL

- Class of airspace: C

- Description of proposed operation: I will be filming the Fall Classic race. I will have a hard ceiling of 200AGL and strictly for the purpose of obtaining footage of the 5K race. I will have emergency services at my disposal and have a spotter in place and in constant communications. I have cones and caution tape to section off a pilot command area where I will conduct my operations. I am a paid camera man for this event.
Why were these waivers not approved?

Waiver/Airspace Authorization

- Regulations subject to waiver:
  - 107.29: Daylight operation
  - 107.41: Operation in certain airspace
- Regulations subject to airspace authorization:
  - 107.41: Operation in certain airspace
- Class of airspace: C
- Description of proposed operation: PRACTICING DRONE OPERATION AND LEARNING ABOUT THE WAIVER PROCESS AND EXACTLY HOW LONG IT TAKES TO RECEIVE A WAIVER.
What is in store for the future of Part 107 waivers in the FAA?

• Allocating additional resources to process waivers
• Improvements to application portal
• Future rulemaking to expand operations permitted
• FAA participation in Industry Consensus Standards (ASTM)
Resources

- FAA UAS Portal: [www.faa.gov/uas](www.faa.gov/uas)
- Waiver portal: [https://www.faa.gov/uas/request_waiver/](https://www.faa.gov/uas/request_waiver/)
- Waiver instructions: [https://www.faa.gov/uas/request_waiver/media/instructions.pdf](https://www.faa.gov/uas/request_waiver/media/instructions.pdf)
- Performance Based Standards: [https://www.faa.gov/uas/request_waiver/media/performance_based_standards.pdf](https://www.faa.gov/uas/request_waiver/media/performance_based_standards.pdf)
- Approved Waivers: [https://www.faa.gov/uas/request_waiver/waivers_granted/](https://www.faa.gov/uas/request_waiver/waivers_granted/)
Questions?

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Part 107 Airspace Authorizations

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107.41 Authorization vs Waiver

Authorization
- Limited duration (up to 6 months)
- Limited operational area
- Quicker to process

Waiver
- Up to 2 years
- Long term recurring operations
- Broad access to controlled airspace
- 90+ days to process
Airspace Authorizations:
Should be requested for a single or limited number of operations conducted over a short period of time (6 months or less)

Airspace Waivers:
Should be requested for recurring operations conducted over an extended period (6 months to 2 years)
Strategies for Airspace Authorization Requests

1. **Only Ask for What You Need**
   - Airspace waivers generally take longer than authorizations
   - More complex requests = longer processing time

2. **Stay Low**
   - Lower altitudes = operations closer to airports
   - Consider additional risk mitigations for requests in high traffic locations

3. **Location**
   - Be precise with your latitude and longitude
   - Be discrete and specific – smaller operating areas are easier to approve

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Airspace Authorization Example

- Local start date: 2016-10-23
- Local start time: 14:00
- Local end date: 2016-10-23
- Local end time: 15:00
- Local time zone: Eastern Time (EST) [UTC-5]
- Proposed area of operations: Main St. between 1st and 5th St., Anytown, NY 12345
- Proposed maximum flight altitude (above ground level): 300'
- Latitude
  - Latitude degrees: 39
  - Latitude minutes: 27
  - Latitude seconds: 06
  - Latitude direction: N
- Longitude
  - Longitude degrees: 77
  - Longitude minutes: 21
  - Longitude seconds: 57
  - Longitude direction: W
- Radius: Less than 1 NM
- Nearest airport: KFDK
- Class of airspace: D
- Description of proposed operation: Aerial photography of lacrosse games. At no time will the sUAS overfly people or the lacrosse players. In event of lost link, the sUAS will automatically return home to the launch site at a preset altitude of 150'.

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Getting to the EVLOS/BVLOS Waiver

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• In 2015, PrecisionHawk entered into a Cooperative Research & Development Agreement (CRDA) with the FAA to conduct Pathfinder research

• Purpose of our Pathfinder research:
  • Collect data
  • Develop operational standards
  • Create technologies necessary to ensure an adequate level of safety in EVLOS and BVLOS operations
Background

Phase I
Research focused on identifying the range where an intruder aircraft could be visually identified.

Phase II
Research focused on the PIC ability to react to an intruder aircraft within the EVLOS range.
The Waiver Application

• Summer of 2016, PrecisionHawk submitted a waiver to fly commercial operations beyond the visual line of sight

• Application leveraged Pathfinder research which validated the EVLOS concept and collected data to define safe operating limitations to safely detect manned aircraft

• Waiver application consisted of:
  1) Concept of Operations
  2) Operational Risk Assessment
Concept of Operations - Introduction

• ConOps described concept and operational procedures, leveraging Pathfinder research (23 pgs)

• No single ConOps for BVLOS operations
  • Spectrum of BVLOS operations, which carry different levels of risk and call for different mitigations

• EVLOS is a subset of BVLOS operations in which the PIC cannot see the UAS, however the PIC can see and scan the airspace in which the UAS is located to detect intruding manned aircraft

• Benefits of EVLOS/BVLOS operations
  • Reduce costs, increase efficiencies
  • Safety advantages in cases where it’s not safe to get very close to the AOI
ConOps – Operational Description

- EVLOS concept – under Pathfinder research, we learned that a PIC can detect and avoid intruding manned aircraft at estimated distance of 2.5 NM provided certain conditions are met.

- Described process by which intruding manned aircraft is detected and avoided:
  - PIC detects intruder
  - PIC uses GCS display to determine relative position of UAS to intruder aircraft
  - PIC analyzes proximity between UAS and intruder aircraft
  - If needed, PIC executes maneuver to avoid collision.
ConOps – Operational Description

Described the following procedures, building off of protocols outlined in Flight Operations Manual:

- Flight planning, preparation procedures
- Take-off/launch procedures
- Described in-flight control and system monitoring capabilities
- Land and recovery procedures
ConOps – Personnel

Set out pilot qualifications, training and experience:

- First, PIC gains VLOS experience in desired operating environment
- PIC learns to tune out distractions i.e. farm equipment, animals
- Then, PIC gains EVLOS/BVLOS training from experienced operator aimed at developing situational awareness required to fly EVLOS/BVLOS
- Flying beyond the line of sight calls for a different skill set than flying within line of sight and therefore requires specialized training
ConOps – Operating Environment

- Described operating range based on Pathfinder results – max 2.5 NM
- Limited operations to rural or remote, sparsely populated areas
- Established meteorological conditions for safe flight – min. 3 statute miles and clear of clouds as outlined in Part 107.51
- Daylight operations
- Class G
ConOps – System Description

• Described our Lancaster system, i.e. navigation, communications, GCS, how it reacts if you lose GPS, have engine failure, redundancies…

• ALSO, extrapolated aspects of UAS systems that are particularly important in affecting risk in order to broaden waiver to apply to additional UAS

• Based on ORA, safe EVLOS/BVLOS operations are not dependent on UAS platform, but rather on the flight control and navigation systems on board UAS that ensure UAS will react predictably and will accurately and reliably conform to its planned geolocation, altitude etc.
Operational Risk Assessment

• 20 pgs…

• Methodology to identify hazards associated with operations, personnel, environment and systems

• Applied quantitative analysis and qualitative insights to hazards and mitigations to determine risk

• Each hazard was placed in risk matrix based on FAA Air Traffic Organization Safety Management System Manual (available on FAA site)

• Risk assessment created rationale to support safety case for flying EVLOS/BVLOS operations
Operational Risk Assessment

Set out potential hazards of flying EVLOS/BVLOS operations, i.e.

- PIC does not observe intruding aircraft
- PIC unable to directly observe spatial relationship between UAS and intruding aircraft
- Flyaway event

Described causes, likelihood, severity, effects and mitigations for each hazard
Operational Risk Assessment

Example - PIC does not observe intruding aircraft

- Causes – PIC is distracted, unexpected weather etc.
- Likelihood – extremely improbable
- Severity – catastrophic
- Effects – possible mid-air collision
- Mitigations – sufficient VLOS flight experience to tune out distractions; in-field training on EVLOS flights etc.
Operational Risk Assessment

• Summarize findings
  • What is the initial risk of each hazard?
  • What is the residual risk after applying mitigations?
• Goals
  • Accurately present risk assessment
  • Apply mitigations to reduce residual risk so that there are no high risk hazards associated with proposed operation
Our Waiver

• Granted August 29, 2016, the day Part 107 came into effect

• Effective until August 31, 2020

• Waived regulations
  • 107.31 Visual line of sight aircraft operation
  • 107.33(b) & (c)(2) Visual observer

• Ability to fly up to 2.5 NM without a VO, and to extend operating area with a VO
Waiver Provisions

• Common Provisions, i.e.
  • Can’t combine waiver with other waivers, authorizations or exemptions without specific FAA approval
  • Responsible person must maintain list of pilots, UAS registration numbers

• Visual line of sight and Visual Observer Provisions, i.e.
  • Class G, max 400 ft, daylight operations in accordance with ConOps
  • Pilot must be able to determine position, altitude, direction of UAS
  • VO must be used if UAS flying beyond range in which PIC can see intruding manned aircraft
  • UAS must be capable of semi-autonomous operations
  • Planned launch and recovery must be conducted in VLOS
  • Displays must be capable of alerting pilot of degraded systems
Workshop 5:
The Part 107 Waiver Process and Airspace Authorizations

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Brad Zeigler, Aviation Safety Analyst, Airman Training and Certification Branch, FAA Flight Standards Service

Brad Zeigler has logged more than 12 years in the aviation safety industry. He is currently an analyst in the Federal Aviation Administration’s (FAA) Flight Standards General Aviation and Commercial Division, focusing on issues related to airman certification and unmanned aircraft regulations. His most recent work includes policy and implementation of the Part 107 Small Unmanned Aircraft Rule, and implementation of the Alternative Pilot Physical Exam and Education Requirements, commonly known as BasicMed.

Prior to joining Flight Standards, Mr. Zeigler evaluated safety-related airport projects under the Airport Improvement Program, enforced airport grant assurances under the Airport Compliance Program, and provided technical expertise to the FAA Wide Area Augmentation System (WAAS) program.

Mr. Zeigler holds Airline Transport Pilot, Remote Pilot and Flight Instructor Certificates. He is an active general aviation pilot in the Washington DC area. He received a bachelor's degree in political science from Randolph-Macon College and a Master of Business Administration from Virginia Commonwealth University.

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Scott Gardner, Acting Manager, FAA Emerging Technologies Integration Directorate, FAA Mission Support Services

Scott Gardner is an Air Traffic Specialist for the UAS Integration Office. He is responsible for processing and coordinating DoD requests for operating UAS in the national airspace system. Mr. Gardner has been with the Federal Aviation Administration for approximately 4 years and with the UAS Integration Office since January. Previously, he was an Air Traffic Security Specialist in the FAA’s Domestic Events Network (DEN), coordinating the FAA’s response to domestic real-time aviation security events.

Mr. Gardner is a retired Colonel with the Air Force Reserve, serving as an Emergency Preparedness Liaison Officer (EPLO) with the National Security Emergency Program (NSEP). He also served as an Air Traffic Control Officer in both the active Air Force and the Air National Guard.

Mr. Gardner earned a Master of Business Administration from Boston University, a bachelor’s degree in business administration from the University of Maine-Augusta, and an associate’s degree from Plymouth State College in Plymouth, NH.

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Diana Cooper, Vice President of Legal & Policy Affairs, PrecisionHawk

Diana Marina Cooper is the Senior Vice President of Policy & Legal Affairs at PrecisionHawk. Prior to joining PrecisionHawk, she led the UAS and Robotics Practice Group at the law firm of LaBarge Weinstein.

Ms. Cooper is the President of the Small UAV Coalition. She also serves on the Advocacy Committee of AUVSI, the Advisory Board of the Energy Drone Coalition, and the FAA DAC Subcommittee.

Ms. Cooper is a legal contributor at Robohub and is frequently quoted on regulatory issues surrounding drones by media outlets including Forbes, The New York Times and The Guardian.

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